

1-72-7

All Announcement of Highway Safety Literature

... A Bi-Monthly Abstract Journal

HSL No. 72-7 April 14, 1972 HS-010 711 - HS-010 801, HS-600 674, HS-800 602, HS-810 189 - 191, HS-820 170, 173 - 175



U.S. International Transportation Exposition
Dulles International Airport
Washington, D.C.
May 27-June 4, 1972

HSL No. 72-7
April 14, 1972



THIS ISSUE CONTAINS:

HS-010 711 - HS-010 801
HS-600 674, HS-800 602
HS-810 189 - 191, HS-820 170,
173 - 175

U.S. Department of Transportation / National Highway Traffic Safety Administration

U.S. DEPT. OF DOCS

An Announcement of
HIGHWAY SAFETY LITERATURE
... A Bi-Monthly Abstract Journal

Published twice-a-month by the National Traffic Safety Administration,
Research Institute, Office of Accident Investigation and Data Analysis
Washington, D.C. 20590

INTRODUCTION

Publications such as journal articles, proceedings, and research reports announced in *Highway Safety Literature* include some of the most recent additions to the collection of the NHTSA Scientific & Technical Information Service. Subject areas covered include all phases of highway, motor vehicle, and traffic safety, especially those encompassed by the National Traffic and Motor Vehicle Safety Act of 1966 and the Highway Safety Act of 1966.

Individual issues of *HSL* are numbered according to the year and the issue number within that year; thus, 72 designates the year and 1, 2, 3, etc. the individual issues. To aid the user in locating citations by the HS-number, the cover bears the inclusive entry number for each issue.

Entries in *HSL* are arranged according to the NHTSA Subject Category List shown in the Table of Contents. The list is a two-level arrangement consisting of five major subject fields subdivided into 59 subject groups. Documents related directly to

the National Highway Traffic Safety Administration (NHTSA) are announced in a separate section headed NHTSA DOCUMENTS and are numbered in five distinct series: NHTSA Accident Investigation Reports (HS-600 000 series), NHTSA Compliance Test Reports (HS-610 000 series), NHTSA Contractors Reports (HS-800 000 series), NHTSA Staff Speeches, Papers, etc. (HS-810 000 series), and NHTSA Imprints (HS-820 000 series). For NHTSA DOCUMENTS in series HS-600 000 and HS-610 000, individual full case reports are available for inspection at the National Highway Traffic Safety Administration. HS-800 000 series and HS-820 000 series are available for purchase from NTIS or GPO (see page ii). Although announced together in a separate section, these documents are also assigned specific subject categories for machine retrieval.

A document which contains a number of separate articles is announced as a complete volume in the subject category most applicable to it as a whole. Entries for the individual articles appear in their most specific subject category.

SAMPLE ENTRIES

Subject Category Array _____
NHSB Accession no HS-800 218 Fld. 5/21; 5/9
Title of document AN INVESTIGATION OF USED CAR
SAFETY STANDARDS--SAFETY
INDEX: FINAL REPORT. VOL. 6 -
APPENDICES G-L
Personal author(s) by E. N. Wells; J. P. Fitzmaurice; C. E.
Guilliams; S. R. Kalin; P. D. Williams
Corporate author Operations Research, Inc.
Collation _____
Publication date 1969 150p
Contract FH-11-6921
Report no. ORI-TR-553-Vol-6; PB-190
523
Abstract Appendices G-L to this study of used
car safety standards include: indenture
model diagrams for classes I-IV motor
trucks; degradation, wear, and failure
data for motor truck classes I-IV; and
safety index tables for classes I-IV
motor trucks.
Search terms; Wear; Trucks;
Failures; Used cars; Inspection
standards

AVAILABILITY: NTIS

HS-004 497 Fld. 5/19

**AUTO THEFT--THE PROBLEM AND
THE CHALLENGE**

by Thomas A. Williams, Sr.

Journal citation Published in *FBI Law Enforcement
Bulletin* v37 n12 p15-7 (Dec 1968)

Gives figures on the extent of the auto
theft problem and comments on anti-
theft devices available now or in the
planning stage.

Search terms: Theft; Theft pro-
tection; Stolen cars

(Note: If the date of a report or
Journal article is not given, the small
letters nd will appear)

TABLE OF CONTENTS

NOTE: () Numbers in parentheses following certain subject groups indicate the Highway Safety Program Standards (No. 1, and up) and/or Federal Motor Vehicle Safety Standards (No. 101 and up) which may apply to these groups.

INTRODUCTION AND	
SAMPLE ENTRIES	Inside Front Cover
AVAILABILITY OF DOCUMENTS	ii

NHTSA SUBJECT FIELDS AND GROUPS

1/0 ACCIDENTS	1
/1 Emergency Services (11, 15-16)	
/2 Injuries	
/3 Investigation (10, 14-15)	
/4 Locations (9, 14)	
/5 Statistical data	
2/0 HIGHWAY SAFETY	4
/1 Breakaway Structures	
/2 Communications	
/3 Debris Hazard Control and Cleanup (15-16)	
/4 Design and Construction (12, 14)	
/5 Lighting (14)	
/6 Maintenance (12)	
/7 Meteorological Conditions	
/8 Police Traffic Services (15)	
/9 Traffic Control (13-14)	
/10 Traffic Courts (7)	
/11 Traffic Records (10)	
3/0 HUMAN FACTORS	6
/1 Alcohol (8, 14)	
/2 Anthropomorphic Data	
/3 Cyclists	
/4 Driver Behavior	
/5 Driver Education (4, 14)	
/6 Driver Licensing (5, 10, 14)	
/7 Drugs Other Than Alcohol	
/8 Environmental Effects	
/9 Impaired Drivers	
/10 Passengers	
/11 Pedestrians (14-15)	
/12 Vision	

4/0 OTHER SAFETY-RELATED AREAS	9
/1 Codes and Laws (6)	
/2 Community Support (17)	
/3 Cost Effectiveness	
/4 Governmental Aspects	
/5 Information Technology	
/6 Insurance	
/7 Mathematical Sciences	
/8 Transportation Systems	
5/0 VEHICLE SAFETY	10

* All Federal Motor Vehicle Safety Standards apply to passenger vehicles. An asterisk before a subject group indicates additional types of vehicles to which the indicated standards may apply.

/1 Brake Systems (102, 105-6, 116)	
* /2 Buses, School Buses, and Multipurpose Passenger Vehicles (102-4, 106-8, 111-3, 116, 205-6, 209, 211)	
* /3 Cycles (3; 108, 112, 116, 205)	
/4 Design (14; 101-2, 105, 107, 201)	
/5 Door Systems (201, 206)	
/6 Fuel Systems (101, 301)	
/7 Glazing Materials (205)	
/8 Hood Latch Systems (113)	
/9 Inspection (1)	
/10 Lighting Systems (101, 105, 108, 112)	
/11 Maintenance and Repairs	
/12 Manufacturers, Distributors, and Dealers	
/13 Mirrors and Mountings (107, 111)	
/14 Occupant Protection (15; 201-4, 207-10)	
/15 Propulsion Systems	
/16 Registration (2, 10)	
/17 Safety Defect Control	
/18 Steering Control System (101, 107, 203-4)	
/19 Theft Protection (114-5)	
* /20 Trucks and Trailers (102-4, 107-8, 112-3, 116, 205-6, 209)	
/21 Used Vehicles	
/22 Wheel Systems (109-10, 211)	
/23 Windshield-Related Systems (101, 103-4, 107, 205, 212)	

NHTSA DOCUMENTS	23
EXECUTIVE SUMMARIES	-

NOTE: Material published in Highway Safety Literature (HSL) is intended for the information and assistance of the motor vehicle and highway safety community. While brand names, equipment model names and identification, and companies may be mentioned from time to time, this data is included as an information service. Inclusion of this information in the HSL should not, under any circumstances, be construed as an endorsement or an approval of any particular product, course, or equipment by the U.S. Department of Transportation, National Highway Traffic Safety Administration.

Harry A. Feinberg
Managing Editor

**AVAILABILITY OF DOCUMENTS
AND
INSTRUCTIONS FOR ORDERING**

Articles and reports whose citations and abstracts appear in HSL are acquired from many sources, such as periodicals, journals, NHTSA Contractors' reports and NHTSA staff speeches, and other reports. Those reports other than NHTSA Contractors' reports and NHTSA generated reports and speeches (see introduction) are assigned a lower consecutive accession (HS-) number.

Department of Transportation personnel may borrow copies of publications announced in HSL from the NHTSA Technical Reference Division. Non-DOT Personnel, in the Washington, D.C. area, may borrow copies of publications for a 24-hour period only. Telephone (202) 426-2768. Government personnel in the Washington, D.C. area, use government ID phone 118-62768.

The names of the journals cited in HSL appear in *italic type* preceded by the words "Published in." The journal containing the article cited may be borrowed from most research and public libraries. Non-DOT personnel outside the Washington area should contact their company or agency libraries for assistance.

NHTSA Contractors' reports and other reports can usually be obtained as indicated under AVAILABILITY. However, there is no certainty that copies will be available for more than a limited period after a report is issued.

The more common availability sources are identified by symbols which are explained in the next column:

NTIS: National Technical Information Service, Springfield, Va. 22151. Order by accession number: HS, AD, or PB. Prepayment is required by NTIS coupon (GPO coupons are not acceptable), check or money order (made payable to the NTIS). PC (Paper copy; full size original or reduced facsimile) prices are \$3.00 up to 300 pages, \$6.00 for 301 to 600 pages, \$9.00 for 601 to 900 pages, and over 900 pages will be quoted on request. Surcharge is added for foreign orders. MF (microfiche approximately 4x6" negative sheet film; reader required) is \$0.95 per report.

GPO: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Give corporate author, title, personal author, and report number. Prepayment is required by GPO coupon (NTIS coupons are not acceptable), check or money order (made payable to the Superintendent of Documents).

HRB: Highway Research Board, National Academy of Sciences, 2101 Constitution Ave., N. W., Washington, D. C. 20418.

NHTSA: National Highway Traffic Safety Administration, General Services Division, Washington, D.C. 20591 (Telephone (202) 426-0874), Give HS-No.

SAE: Society of Automotive Engineers, Dept. HSL, 2 Pennsylvania Plaza, New York, N.Y. 10001. Order by SAE report numbers. Prices given are list; discounts are available to SAE members and sometimes to libraries and U.S. Government Agencies. Prepayment is required; orders received without payment are subject to a \$1 handling charge.

IMPORTANT NOTICE

WHEN REQUESTING a document, to be absolutely sure you receive what you order, give the accession number (HS, PB, AD number) or report number (in cases such as an SAE document), title of report, and the personal or corporate author (whichever is cited). When requesting an HS-numbered document from NTIS, add DOT/to the prefix HS; example HS-800 000 should be ordered as DOT/HS-800 000.

1/0 ACCIDENTS

1/1 Emergency Services

HS-010 711 Fld. 1/1

FIRST AID FOR MOTORISTS

by Hanns Pacy

Published in *Medical Journal of Australia* v2 p280-3 (8 Aug 1970)

nd 4 refs

The fate of road accident victims is usually in the hands of the first person who stops and renders first aid. A proposal for first aid training that would be part of driver licensing examinations is put forward. Methods of resuscitation are discussed, and techniques for removing injured victims from wrecked cars are described. Motorists trained in first aid could save lives which are now lost before an ambulance can arrive.

Search terms: First aid; Occupant rescue; Accident survival time; Resuscitation; Emergency medical services; Accident survivors

HS-010 712 Fld. 1/1

THE ORGANIZATION OF AIR TRANSPORT SERVICES FOR SICK AND INJURED PERSONS, PARTICULARLY ROAD ACCIDENT VICTIMS

by T. Lomonaco

Published in *Panminerva Medica* v11 n7-8 p343-6 (Jul-Aug 1969)

nd

Original text published as "L'organizzazione dei Trapianti Aerei per Feriti ed Ammalati e Particolarmente per le Vittime della Strada," in *Minerva Aerospaziale*.

The employment of air transport services for road accident victims is discussed.

The use of helicopters is examined in detail and pathophysiological limitations (such as anoxia, total barometric depression in case of high altitude flight, and excessive acceleration, vibration, luminous radiation, and unsatisfactory temperatures) as well as the means to eliminate them are illustrated.

Search terms: Helicopter ambulances; Transportation of injured; First aid; Anoxia; Emergency equipment; Environmental factors; Medical emergencies

1/2 Injuries

HS-010 713 Fld. 1/2

A CHARACTERISTIC TYPE OF MOTORCYCLE FRACTURE OF THE TIBIA

by Roland D. Jackson

Published in *Southern Medical Journal* v63 p222-5 (Feb 1970)

nd 7 refs

A characteristic pattern of leg injury has been observed with some regularity in victims of motorcycle accidents. This injury is characterized by a blow to the front of the leg producing a comminuted or segmental fracture of the tibial shaft with posterior angulation of sizable fragments of bone. The displaced fragments may be entrapped in the soft tissues of the posterior muscle compartment and not returned readily to normal position by manipulation reduction. The resulting instability of the fracture often requires skeletal fixation in order to maintain reduction. Three case reports are presented to demonstrate the varying degrees of severity of this injury. The author suggests that crash bars or shielding devices be required to protect the legs and prevent this type of injury.

Search terms: Fractures; Leg injuries; Motorcycle operator injuries; Muscle injuries; Injury case reports; Impact protection; Impact caused skeletal damage; Leg impact areas

HS-010 714 Fld. 1/2

RATING THE SEVERITY OF TISSUE DAMAGE. 1. THE ABBREVIATED SCALE

American Medical Assoc.

Published in *Journal of the American Medical Association* v215 n2 p277-80 (11 Jan 1971)

nd 10 refs

A comprehensive rating system for tissue damage is being developed to provide researchers who investigate automotive crash injuries with an accurate method for rating and comparing injuries and at the same time to standardize language used to describe the injuries. A review of existing systems' is given and a short history of the abbreviated injury scale developed by the AMA's Committee on Medical Aspects of Automotive Safety is included.

Search terms: Injury severity index; Injury research; Injury classification

HS-010 715 Fld. 1/2

COMBINED VISCERAL AND VERTEBRAL INJURIES FROM LAP TYPE SEAT BELTS

by Wallace P. Ritchie, Jr.; Robert A. Ersek; Wilton L. Bunch; Richard L. Simmons

Published in *Surgery, Gynecology and Obstetrics* v131 p431-5 (Sep 1970)

nd 5 refs

The two distinct patterns of seat belt injuries, injuries of the abdominal wall and intra-abdominal viscera and transverse fracture of one or more lumbar vertebrae, may be present concomitantly. Both delay in laparotomy and the inadvertent production of paraplegia can be avoided if this is recognized. Abdominal ecchymosis, signs of peritoneal irritation, even though minimal, and back pain should alert the attending physician to

1/2 Injuries (Cont'd.)

HS-010 715 (Cont'd.)

this combination. The case report of an accident in which four members of a family sustained seat belt injuries, two of which combined both visceral and lumbar vertebral components, is detailed.

Search terms: Seat belt caused injuries; Abdominal injuries; Diagnosis; Medical treatment; Surgery; Spinal fractures; Injury case reports

HS-010 716 Fld. 1/2

ESSENTIAL POSTMORTEM FINDINGS IN THE TRAFFIC ACCIDENT VICTIM

by Werner U. Spitz

Published in *Archives of Pathology* v90 p451-7 (Nov 1970)

nd 10 refs

Valuable information regarding an automobile accident may often be derived from a careful analysis of the injuries of the victim. No attempt can or should be made to interpret each and every injury with respect to the mechanism by which it was sustained. Rather, patterned injuries, such as the imprint of a door knob and other injuries which by virtue of their location are known by experience to be caused in a specific way, should be considered. Incisions should be made in certain areas of the body which are known to be frequently traumatized while showing minimal or no external evidence of injury. This is a prerequisite for attempting to understand the mechanism of a given motor vehicular accident. This practice will map out the injuries not only according to their distribution but also in regard to their appearance, thereby enabling the documentation of all points of significant impact. Injuries common to pedestrians, drivers, and passengers are described.

Search terms: Accident reconstruction; Autopsies; Fatality causes; Injury research; Pedestrian injuries; Driver injuries; Passenger injuries

HS-010 717 Fld. 1/2; 5/7

WINDSCREEN INJURIES OF THE BRAIN

by R. G. Rushworth; J. G. Toakley

Published in *Medical Journal of Australia* v2 p80-3 (12 Jul 1969)

nd 3 refs

Serious intracranial injuries may be inflicted on the occupants of a motor vehicle by the windscreen. Five cases of compound brain wound, one fatal, are described. The mechanism of injury in relation to windscreen structure is discussed, and the principles of neurosurgical management are outlined. The importance of seat belts in the prevention of such injuries is stressed.

Search terms: Windshield caused injuries; Brain injuries; Skull fractures; Surgery; Tempered glass caused injuries; Diagnosis; Safety glass; Head injuries; Injury case reports

HS-010 718 Fld. 1/2; 5/14

SAFETY OF LAP-BELT RESTRAINT FOR PREGNANT VICTIMS OF AUTOMOBILE COLLISIONS

by Warren M. Crosby; J. Paul Costiloe

Published in *New England Journal of Medicine* v284 n12 p632-6 (25 Mar 1971)

nd 12 refs

Of 208 pregnant victims of severe automobile accidents, 28 wore lap belts, and 180 were unrestrained. Lap-belt restraint was associated with a reduction in maternal death from 7.8 to 3.6 percent, and with an increase in fetal loss from 14.4 to 16.7 percent. These differences are not statistically significant, and no evidence was obtained that lap-belt restraints increased mortality of either mother or fetus involved in severe accidents. Among unbelted pregnant women involved in severe collisions, the death

rate was 33 percent of those ejected from the car and five percent of those not ejected. The fetal death rate was 47 percent when the mother was ejected and 11 percent when she was not. These differences are statistically significant. Thus, lap belts, which usually prevent ejection, may be recommended for pregnant travelers.

Search term: Fetal death; Seat belt usage; Uterine injuries; Seat belt caused injuries; Ejection; Abortion; Fatality causes; Fatality rates; Pregnancy; Injury rates; Accident severity

1/3 Investigation

HS-010 719 Fld. 1/3

BERKELEY CRITICAL-INCIDENT TRAFFIC SURVEY. SUMMARY OF RETURNS FROM THE FIRST 4000 MAILING

by E. R. F. W. Crossman; K. A. Wright
California Univ., Berkeley

1968 14p
Contract PHS-UI-00016-03
Report no. 68-8

This survey was conducted to acquire data on the frequency and environment involved in loss of control accidents. The critical incident technique was used. The questionnaires were designed to ensure that major variables were reported, although the forms were quite flexible. It was concluded that inter-vehicle conflicts are the major source of critical incidents. They are more frequently compounded by human controller malfunction (lapse of attention) and overload (due to highway situations) than by mechanical or physical factors. Loss of control is provoked most frequently by lapse of attention, secondly by unexpected behavior of other road users, and sometimes by equipment malfunction (blowout).

Search terms: Questionnaires; Accident research; Loss of control caused accidents; Accident factors; Traffic

conflicts; Driving conditions; Accident risks; Attention lapses; Accident causes; Environmental factors; Accident avoidance

HS-010 720 Fld. 1/3

THE AUTOMOBILE: THE GREATEST KILLER

by Edward J. Kowalewski

Published in *Texas Medicine* v66 p92-6 (Jun 1970)

nd

Accidents are the leading cause of death among all persons aged one to thirty-seven, and the fourth leading cause of death among persons of all ages. A physician has the responsibility to make a contribution towards saving life and preventing pain and injury. He can do that by getting involved in highway safety, by trying to determine the causes of accidents and injuries, and making these findings known to the proper authorities, by performing the physical examinations required to secure a license with great care, so as to be able to judge better the candidate's ability to drive a vehicle, and by counseling the young driver and his parents. The medical profession should be among the leaders who bring the disease of death on the highway under eventual control.

Search terms: Accident prevention; Driver counseling; Physicians and highway safety; Driver physical examinations

HS-010 721 Fld. 1/3; 5/17

MOTOR VEHICLE COMPONENT FAILURES IN ROAD ACCIDENTS

by Peter B. Wilson

Published in *Journal of the Forensic Sciences Society* v9 p3-12 (Jul 1969)

nd

The failure of a component part of a motor vehicle has, on a number of occasions, been found to have been the cause of, or a factor in, a road accident. Examples of such failures, taken from case work, are described and illustrated, together with certain examples of parts damaged as a consequence of collisions. Tire failures are excluded from this discussion.

Search terms: Failure caused accidents; Fatigue (materials); Accident causes; Accident factors; Failures; Wear; Damage

1/5 Statistical data

HS-010 722 Fld. 1/5

ROAD ACCIDENT, AN EMERGENCY PROBLEM IN CALCUTTA

by A. Bhandari; A. L. Saha

Published in *Journal of the Indian Medical Association* v53 n12 p588-93 (16 Dec 1969)

nd 9 refs

A study of 19 years' death records in the city of Calcutta reveals a steady rise in the trend of mortality from road accidents in relation to the population, but a gradual decline in the trend in relation to the number of vehicles in the city. Among the principal causes of death in the city, the mortality from traffic accidents has been found to be fifth in order as a single cause of death during the year 1967. While the other principal causes of mortality were either stationary or declining, the mortality from this cause has been found to be increasing during the period from 1959 to 1967.

Search terms: Fatality rates; Accident rates; Accident statistics; Accident studies; Fatalities by sex; Calcutta; Fatalities by age

HS-010 723 Fld. 1/5; 1/3; 3/1

DEATH ON THE HIGHWAY: AN ANALYSIS OF 100 ROAD ACCIDENTS IN A RURAL AREA

by R. B. Tennent

Published in *New Zealand Medical Journal* v70 p159-61 (Sep 1969)

nd

An analysis of 100 road accidents is reported. The teenage drinking problem is not severe, but most teenage accidents are due to bad driving and inexperience. Their elders drink much more, but are more experienced drivers. The necessity of testing aged drivers, as well as old vehicles is questioned. Very few people are injured who use safety belts. Those that are usually are wearing diagonal belts. At least as far as this area is concerned official statistics do not give a valid picture because they understate the problem of alcohol and road conditions in regard to accidents. Alcohol was a factor in more than 25% of adult drivers but only 9% of teenage drivers in these accidents.

Search terms: Accident analysis; Age factor in accidents; Adolescent drivers; Driver error caused accidents; Accident statistics; Adult drivers; Driver experience; Fatalities; Seat belt caused injuries; New Zealand; Accident causes; Drinking drivers; Rural accidents; Injury statistics

HS-010 724 Fld. 1/5

AUTOMOBILE ACCIDENTS OCCURRING IN A MALE COLLEGE POPULATION

by Carl R. Ruch; Duane E. Stackhouse; Dill J. Albright, Jr.

Published in *Journal of the American College Health Association* v18 p308-12 (Apr 1970)

nd

1/5 Statistical data (Cont'd.)

HS-010 724 (Cont'd.)

A survey was made of accidents occurring to male college students between the ages of 17 and 25 years. A total of 570 students was initially questioned and it was found that 39.5% had been involved in vehicular accidents. The average driver was a 19.3 year-old male who had been driving for 2.6 years. There were no deaths in this series and in only 11% of the accidents did hospitalization result. Almost half of these accidents occurred in city driving and 80% on roads other than turnpikes and highways. Driving errors and poor judgment were listed more frequently than any other causative factor; speeding, bad weather, and distraction were mentioned as major factors. Students who received their driver training from their parents did better in avoiding accidents. Injuries received by motorcycle operators required more medical care and hospitalization. The most significant point to be made regarding seat belts is that they are simply not being used.

Search terms: Accident studies; Driver errors; Driver education; Driver error caused accidents; Driver fatigue; Attention lapses; Young adult drivers; Accident rates; Motorcycle accidents; Time of accidents; Seat belt usage; Adolescent drivers; Accident statistics; High speed caused accidents; Accident factors; Male drivers; Injury severity; College students; Accident causes; Automobile accidents

HS-010 725 Fld. 1/5; 1/2; 5/20

SNOWMOBILE ACCIDENTS

by J. W. Martyn

Published in *Journal of the Canadian Medical Association* v101 p35-7 (27 Dec 1969)

nd

Includes French summary.

The recreational use of powerful snowmobiles is increasing and the number of

resultant accidents and injuries has steadily risen. Included in this article are eight tables: snowmobiles in use in North America; deaths from snowmobile accidents in Ontario; incidence of injury related to age; site of injury in 135 patients; lower extremity injuries; upper extremity injuries; other injuries; and mechanism of injury. Suggestions are given for safer design and safer usage of snowmobiles.

Search terms: Snowmobile caused injuries; Snowmobile design; Snowmobile accidents; Accident statistics; Fatality rates; Injuries by age; Injuries by body area; Ontario; Leg injuries; Arm injuries

HS-010 726 Fld. 1/5; 1/3; 5/20

HIGHWAY BEHEMOTHS: DUMP TRUCKS AND TRANSIT MIX TRUCKS COMPARED

by James O'Day

Published in *HIT LAB Reports* p6-7 (Jul 1971)

nd

The frequency and severity of transit mix truck crashes and dump truck crashes in Texas during 1969 are tabulated. No fatalities occurred in the 360 transit mix crashes identified. However, 22 fatalities occurred in the control group consisting of 1,940 dump truck crashes. With Texas representing approximately 6.5% of the residents of the United States, it was concluded that fatalities involving transit mix trucks are very likely to be rare events.

Search terms: Truck accidents; Accident statistics; Driver age; Texas; Fatality rates; Transit mix trucks; Dump trucks

2/0 HIGHWAY SAFETY

2/2 Communications

HS-010 727 Fld. 2/2

DESIGNING THE FIRST FLASH INSTALLATION

by Ivor S. Wisepart

Published in *Highway Research Record* n303 p89-94 (1970)

nd 2 refs

This system was developed under contract with Bureau of Public Roads. Presented at the 49th annual meeting of the Highway Res. Board.

The feasibility has been demonstrated of a technique that relies on passing motorists to report vehicles needing help. The system is named FLASH, which is an acronym for Flash Lights And Send Help. The design and operation of the first installation on Interstate 4 between Lakeland and Orlando, Florida is described. The greatest advantages of the system are that all present road vehicles are equipped to participate, and that minimum learning is required of the driver. A cooperating driver who has seen a disabled vehicle simply flashes his bright lights three times when he sees a roadside FLASH sign. A detector and computer combination then transmits a coded signal to highway patrol headquarters.

Search terms: Highway communication; Driver aid systems; Disabled vehicles; Police traffic services; Rural highways; Florida; Flash Lights and Send Help Program

HS-010 728 Fld. 2/2

STUDY OF RURAL FREEWAY EMERGENCY COMMUNICATIONS FOR STRANDED MOTORISTS

by Walter J. Roth

Published in *Highway Research Record* n303 p74-88 (1970)

nd

Presented at the 49th annual meeting of the Highway Res. Board.

motorists' needs and the ways these needs are met are examined from observations made in the summer of 1968 and the fall of 1969 indicate about 50% of those who needed aid used the motor-telephone. The rate for vehicle breakdowns 12 minutes or longer was one per 6 miles each 66 minutes in the summer survey and one stop each 99 minutes in the winter survey. This is in line with other reported findings that with greater assistance needs in rural areas assistance rates may correlate to traffic volumes, but these have not been fully analyzed. The percentage of trucks requiring assistance is tentatively large compared to their percentage of the traffic stream. Drivers of heavier cars requiring mechanical assistance are most likely to phone for aid. Of those who used the roadside phones, it is thought the system should be ex-

Search terms: Freeways; Roadside assistance; Highway communication; Telephone aid systems; Michigan; Rural areas; Traffic volume; Disabled vehicles; Questionnaires; Program evaluation

Meteorological Conditions

729 Fld. 2/7; 5/6

DISTRIBUTION OF LIGHT HYDROCARBONS IN AMBIENT AIR

by R. Stephens; Frank R. Bur-

Published in *Journal of the Air Pollution Association* v19 n12 p929-36 (1969)

15

Concentration of hydrocarbons which are in ambient polluted air provide a relatively rich source of information regarding the nature of this type of pollution. Except for samples taken directly near sources of hydrocarbon

pollution, air samples invariably resemble auto exhaust, with an addition of natural gas and of C₃-C₅ paraffins which resemble gasoline vapor. Samples taken in industrial areas and near the smoke plume from a brush fire showed distinctive differences in composition. During the smog season in the fall of 1968 good data were obtained of typical or representative samples of light, medium, and heavy smog. These show the expected depletion of more reactive hydrocarbons in a much more convincing way than before.

Search terms: Air pollutant identification; Hydrocarbons; Nitrogen oxides; Organic air pollutants; Industrial air pollution; Photochemical reactions; Vehicle air pollution; Power plant air pollution; Smog; Methane; Smoke; Air pollution sources; Air sampling; Chemical analysis; Natural gas

2/9 Traffic Control

HS-010 730 Fld. 2/9

AN EMPIRICAL ANALYSIS OF LANE CHANGING ON MULTI-LANE HIGHWAYS

by R. D. Worrall; A. G. R. Bullen

Published in *Highway Research Record* n303 p30-43 (1970)

and 12 refs

Sponsored by Committee on Freeway Operations. Presented at 49th annual meeting of the Highway Res. Board.

The paper describes a macroscopic analysis of lane-changing behavior on multi-lane highways. It includes descriptions of the pattern and frequency of lane-changing maneuvers observed under varying road and traffic conditions, the distribution of maneuver lengths and times, and the acceptance and rejection of gaps by lane-changing vehicles. Data for the study were collected at a sample of 30 freeway locations in Chicago. Lane

changing is shown to be essentially a random event in the traffic stream, subject to considerable variation at any point in either time or space.

Search terms: Lane changing; Gap acceptance; Freeway driving; Statistical analysis; Mathematical models; Chicago; Ramps; Time series analysis; Traffic volume; Speed differential

HS-010 731 Fld. 2/9

FEASIBILITY OF AN EXCLUSIVE LANE FOR BUSES ON THE SAN FRANCISCO-OAKLAND BAY BRIDGE

by Darryl B. Martin

Published in *Highway Research Record* n303 p17-29 (1970)

and

Sponsored by Committee on Freeway Operations. Presented at 49th annual meeting of the Highway Research Board.

The bay bridge has the greatest peak-hour bus concentration in California, and delay occurs because demand exceeds capacity during peak periods. The existing traffic conditions were surveyed for both morning and evening peak periods. The data obtained included capacity of bridge, number of persons using each mode, volumes (automobiles and buses), travel times, and demand. These data were then used in a simulation of conditions with an exclusive bus lane in effect. An exclusive bus lane on the bay bridge does not appear feasible because the increased delay to automobile users would far exceed the savings to the bus passengers.

Search terms: Bus lanes; Lane usage; Highway bridges; Traffic flow; Traffic simulation; Modal choice; California; Peak hour traffic; Traffic congestion; Travel time; Traffic capacity; Traffic volume; Traffic characteristics

2/9 Traffic Control (Cont'd.)

HS-010 732 Fld. 2/9

AN EVALUATION OF RAMP CONTROL ON THE HARBOR FREEWAY IN LOS ANGELES

by Leonard Newman; Alex M. Dunnet; Gerald J. Meis

Published in *Highway Research Record* n303 p44-55 (1970)

nd 1 ref

Sponsored by Committee on Freeway Operations. Presented at the 49th Annual Meeting of the Highway Res. Board.

Congestion occurred each weekday in the four outbound lanes during the evening peak period, while the adjacent parallel streets were relatively uncrowded. The control project is designed to reduce total travel time through the freeway corridor by metering five on-ramps and closing one ramp in a five mile section during the peak period. Special techniques include bus exemptions, storage of queued vehicles, and two-abreast metering. Results show that freeway users are saving about 1,000 vehicle-hours per day against a loss, or increased travel time for diverted or delayed ramp traffic, of about 130 vehicle-hours.

Search terms: Ramp control; Access control; Traffic control; Freeways; Peak hour traffic; Traffic congestion; Traffic delay minimization; Controlled access highways; Los Angeles; Traffic metering; Travel time; Queueing; Traffic density

HS-010 733 Fld. 2/9; 4/7

THE ANALYSIS AND DESIGN OF FREEWAY ENTRANCE RAMP CONTROL SYSTEMS

by H. Nathan Yagoda; Louis J. Pignataro

Published in *Highway Research Record* n303 p56-73 (1970)

nd 6 refs

Presented at 49th annual meeting of the Highway Res. Board.

This paper describes some of the results obtained from an analytic study undertaken as part of the Gulf Freeway surveillance and control project in which the on-line dynamic control of individual entrance ramps is investigated. Two alternate control patterns are considered. The first is the control of ramps on which a string of one or more vehicles is released when a suitable merge opportunity arises and all previously released vehicles have successfully merged. In the second, the requirement that the ramp be cleared of all previously released vehicles is relaxed and the controller may release an additional vehicle whenever the expected delay associated with a merge into a detected gap is less than the expected delay associated with clearing the ramp. Fixed-time and demand-capacity metering controllers are special cases of the control system analysis presented.

Search terms: Ramp control; Access control; Traffic control; Freeways; Gap acceptance; Mathematical models; Mathematical analysis; Traffic delay minimization; Traffic engineering; Traffic metering; Traffic metering controls; Controlled access highways; Gap utilization; Merging

3/0 HUMAN FACTORS**3/1 Alcohol**

HS-010 734 Fld. 3/1

ALCOHOL AND THE HOLOCAUST ON OUR ROADS

by H. A. Shapiro

Published in *Journal of Forensic Medicine* v17 n1 p1-4 (Jan-Mar 1970)

nd 11 refs

In South Africa the fatality rate of road accidents is greater in actual numbers than in any single country in Europe and proportionately the greatest in the

world. The role of alcohol in accidents is discussed, and studies made in the United States and United Kingdom are described. A statistical analysis made by South African police revealed that alcohol played a role in only 5% of fatal accidents. It is suggested that the accident problem is complex and cannot be successfully dealt with by placing most or all of the blame on drinking.

Search terms: Fatality rates; Drinking drivers; Driver intoxication; Accident causes; Fatalities; Republic of South Africa

HS-010 735 Fld. 3/1; 1/3

ALCOHOL-RELATED HIGHWAY ACCIDENTS. A HOSPITAL SURVEY

by Jerome R. Hanson; John N. Simons

Published in *Minnesota Medicine* v53 p905-7 (Aug 1970)

nd

This study documents the devastating role that alcohol plays as a causative factor in automobile accidents, particularly in the youthful driver. In the 110 drivers evaluated, the involvement of alcohol is related to the age and sex of the drivers, type of accident, and time of day. Data were based on interviews, obvious physical findings, and examination of involved vehicles, not on blood tests, which probably resulted in underestimating alcohol use. Alcohol may have played a significant role in 46% of the accidents studied. Of the 110 drivers studied, 85 were male and 25 were female. Almost a fourth of the accidents were single car, single occupant accidents, and alcohol was involved in more than half of these.

Search terms: Accident causes; Drinking drivers; Male drivers; Accident studies; Female drivers; Age factor in accidents; Sex factor in accidents; Automobile accidents; Truck accidents; Lone driver accidents; Single

vehicle accidents/Minnesota/Alcohol usage/Time of accidents/Driver age/Driver sex/Driver intoxication

HS-010 736 Fld. 3/1; 3/7

THE COMBINED EFFECT OF ALCOHOL AND AMITRIPTYLINE ON SKILLS SIMILAR TO MOTOR-CAR DRIVING

by Joanne Patman; Ali A. Landauer; Gerald Milner

Published in *Medical Journal of Australia* v2 p946-9 (8 Nov 1969)

nd 18 refs

Based on a Master's thesis submitted to the Univ. of Western Australia.

In a double-blind study, 12 normal subjects were given amitriptyline, in a dosage of 50 mg every 12 hours for five days, and were tested by means of a motor skill battery with and without alcohol administration. Comparisons with an equally constituted control group showed that some decrements in performance were due to alcohol consumption. Amitriptyline administration did not significantly affect test performance, nor was any significant interaction effect noted. The importance of testing for interaction between the commonly prescribed psychotropic agents and alcohol is discussed since potentiation of alcohol effects may at times contribute to traffic accidents and the hazards of drug overdosage.

Search terms: Synergism; Blood alcohol levels; Alcohol effects; Drug effects; Amitriptyline; Driver performance; Driver skills; Driver tests

3/4 Driver Behavior

HS-010 737 Fld. 3/4

HEART RATE MEASUREMENTS OF DRIVERS WITH THE HIGHWAY SYSTEMS RESEARCH CAR

by Fletcher N. Platt

Published in *Journal of the Medical Association of Georgia* v59 p16-22 (Jan 1970)

nd 18 refs

Presented before the 115th annual session of the Medical Association of Georgia, Savannah, 5-7 May 1969.

A review of studies on the heart rate measurement of drivers and pilots under stress is given. Exploratory research using the Highway Systems Research Car and evaluating the heart rate of subjects under stressful situations is described.

Search terms: Driver performance under stress; Driver tests; Heart rate; Highway Systems Research Car; Pilots; Driving conditions; Driving tasks

HS-010 738 Fld. 3/4

AGGRESSIVE DRIVING

by Van Buren O. Hammett

Published in *Pennsylvania Medicine* v73 p64, 66-7 (Jan 1970)

nd

In order to establish the fact that aggressive driving is a common aspect of everyday life, a simple study was conducted: an observer drove 24 miles daily for 34 days, making observations until 100 instances of aggressive driving had been observed. The results are quite interesting: not one single accident was seen to occur as a result of aggressive driving and not one instance of counter-aggression was observed. Thus, it appears that in the phenomenon of aggressive driving, two components are involved: the action of the aggressor, and the action of the one threatened by the aggressor. In all instances, the threatened driver took evasive action.

Search terms: Driver behavior research; Aggression; Defensive driving; Driver skills; Threat; Driver perform-

ance under stress; Accident avoidance; Driver emergency responses; Reckless driving; Risk taking

HS-010 739 Fld. 3/4; 5/4

SAFE DRIVING AND SAFE CARS. A DOCTOR'S OPINIONS BASED ON 55 YEARS OF EXPERIENCE

by Perry Rogers

Published in *Southwestern Medicine* v51 n1 p17-20 (Jan 1970)

nd

Automobile accidents are blamed on either driver error or car fault. The most frequent causes of driver error are inattention and indecision. The manufacture of safe cars is complicated by all manner of concessions to styling, production, and sales, which put unsafe cars into the hands of unsafe drivers.

Search terms: Careless driving; Driver behavior; Attention lapses; Automobile design; Safety design; Driver errors; Defective vehicles

3/5 Driver Education

HS-010 740 Fld. 3/5

A STUDY OF THE EFFICIENCY AND EFFECTIVENESS OF FOUR DIFFERENT MODES OF INSTRUCTION IN PROVIDING LEARNING EXPERIENCES FOR HIGH SCHOOL DRIVER EDUCATION STUDENTS

by Edward R. McIntosh

Michigan State Univ.

1967 129p 32 refs

Doctoral dissertation.

The purpose of this study was to secure evidence upon which to base the most

3/5 Driver Education (Cont'd.)**HS-010 740 (Cont'd.)**

efficient and effective design, production, and utilization of instructional materials. High school driver-education students were selected during the summer as the population for the study. The subjects used four different instructional materials; two were not designed specifically to teach driving skills (documentary) and two were so designed (non-documentary). The analysis showed that the documentary materials were not nearly so effective in inducing student behavioral changes as were the non-documentary materials. For high school driver-education students it was found that instructional materials should present the concepts to be learned in a serious manner; should not introduce anything which inhibits or interferes with attention to, or comprehension of these concepts, and should be concise and businesslike.

Search terms: High school driving courses; High school drivers; Instructional materials; Driver education evaluation; Theses; Freeway driving; Factors analysis; Driver skills; Statistical analysis; Driver evaluation devices; Audiovisual aids; Speed, patterns; Steering; Acceleration; Braking

3/6 Driver Licensing**HS-010 741 Fld. 3/6**

MOTORCYCLE OPERATOR LICENSING. DESIGN, ANALYSIS, AND REVISION OF THE TEXAS LICENSING PROGRAM

by Lewis A. Locke

Texas Dept. of Public Safety; Texas A and M Univ.

1968 52p refs

Supported jointly by the State of Texas and the U.S. Dept. of Transportation.

Separate testing and licensing of motorcycle operators became effective in 1968. Licensing materials designed were a handbook, written test, and off-street and on-street driving tests. Statistical analysis of completed tests, preparation of revised materials, and recommendations are presented with examples of the materials.

Search terms: Driver license examination; Driver tests; Offstreet driver tests; Motorcycle operator licensing; Driver license manuals; Statistical analysis

3/7 Drugs Other Than Alcohol**HS-010 742 Fld. 3/7; 3/1; 1/1**

DRUGS, DRUNKEN DRIVING, THE DELIVERY OF MEDICAL CARE, THE HIGH COST OF HOSPITALIZATION

by Stanley D. Simon

Published in *Rhode Island Medical Journal* v53 p276-281, 283 (May 1970)

Presented to Rhode Island Medical Society, Providence, 4 Apr 1970.

The president of the Rhode Island Medical Society reviews the most urgent problems that face the Rhode Island physician: the legal issues surrounding the use of marijuana and narcotic drugs, the testing of individuals involved in accidents to determine blood alcohol volume, the problem of health care delivery, and the high costs of health care and hospitalization.

Search terms: Drug addiction; Marijuana; Drinking drivers; Blood alcohol levels; Health insurance; Medical services; Medical costs; Hospitals; Physicians; Alcohol blood tests; Driver intoxication; Sociological factors

3/9 Impaired Drivers**HS-010 743 Fld. 3/9**

STUDY THE PHYSICALLY IMPAIRED DRIVER AT UNIVERSITY OF DENVER

Anonymous

Published in *Traffic Safety* v70 n4 p11, 38, 40 (Apr 1970)

nd

A study dealing with the licensing, driving records, training, and insurability of physically impaired drivers, and sponsored by the University of Denver and the Rehabilitation Services Administration of the Department of Health, Education and Welfare shows that this class of drivers ranks among the most safety conscious of the country.

Search terms: Handicapped drivers; Driver education; Accident rates; Driver records; Low risk drivers

HS-010 744 Fld. 3/9; 3/6**THE CAR AND THE CARDIAC**

by Naseeb B. Baroodly

Published in *American Family Physician* v2 n6 p71-6

nd

A cold car may induce angina or Raynaud's phenomenon in some patients with cardiovascular disease. Sustained periods in a hot automobile should also be avoided. Patients with angina should drive cars equipped with energy-saving devices, such as power steering. Driving emergencies may precipitate angina. Patients with uncontrolled heart block should not be allowed to drive. Cerebrovascular disorders characterized by vertigo and labyrinthine disturbances are extremely hazardous when driving. Medications may also contribute to accidents or injuries.

Search terms: Cardiovascular diseases; Medical case reports; Myocardial symptoms; Medical factor caused accidents; Drug caused accidents; Drug effects; Stress (physiology); Stress (psychology); Driver physical fitness; Angina pectoris; Cerebrovascular diseases; Cold; Heat

3/12 Vision

HS-010 745 Fld. 3/12

THE BLINK METHOD AS AN ASSESSMENT OF FATIGUE

by T. Fukui; T. Morioka

Published in *Ergonomics* v14 n1 p23-30 (Jan 1971)

nd 7 refs

Includes French and German abstracts, and discussion.

A moving object is best recognized by looking with repeated rapid blinks as compared with the usual method of looking. Blinking is associated with the function of the eyelids and oculomotor muscles, retina, optic nerve, and cerebrum. Hence, the blink value may be an indication of the total functioning of these organs and the autonomic nervous system. A method of measuring the blink value is presented, which enables rapid and accurate measurement of fatigue in the whole body.

Search terms: Driver fatigue; Fatigue tests; Flicker frequency; Visual perception; Vision age changes; Visual behavior; Medical factors; Test equipment

HS-010 746 Fld. 3/12

COLOURED GLASSES AND COLOUR VISION, WITH REFERENCE TO CAR DRIVING

by Lennart Berggren

Published in *Acta Ophthalmologica* v48 p537-45 (1970)

nd 12 refs

Female subjects with normal color vision, 20-50 years of age, were tested on their ability to do an anomaloscopic color match and to interpret pseudo-isochromatic plates without and with colored sun glasses of ten different kinds. It was found that even glasses of supposed good quality markedly affected color matching to green-red quotients outside the normal range. Only with two kinds of glasses, the Polaroid glasses and the Ray Ban G 31 glasses,

was it possible to do a normal color match. The interpretation of pseudo-isochromatic plates was impaired by glasses with high absorptive properties. The findings are discussed mainly in relation to the question of whether color discrimination plays any role in safe driving.

Search terms: Vision tests; Color perception; Sunglasses; Green; Red; Females

4/0 OTHER SAFETY-RELATED AREAS

4/1 Codes and Laws

HS-010 747 Fld. 4/1

A STUDY OF TRANSPORTATION OF HAZARDOUS MATERIALS. A REPORT TO THE OFFICE OF HAZARDOUS MATERIALS OF THE U. S. DEPARTMENT OF TRANSPORTATION

National Acad. of Sciences—National Res. Council

1969 277p refs
Contract DOT-OS-A9-106

The Office of Hazardous Materials of the Department of Transportation requested the National Research Council to assist in considering a technical and engineering basis for regulation of hazardous materials transportation by all modes—highway, rail, air and water. This report constitutes the findings of a study undertaken for the specific purposes of: appraising existing knowledge, procedures, and practices of all transportation modes; exploring improved or revised concepts for approach to regulations, based on scientific knowledge and engineering methods, and suited to the practices and materials of an increasingly technological culture; identifying existing and new resources and facilities needed to support more technology-oriented approaches to public safety regulation; and recommending immediate and longer-term actions for improving the present regulatory system for hazardous materials transportation.

Search terms: Marine transportation; Transportation of hazardous materials;

Hazardous materials; Accident risks; Rail transportation; Air Transportation; Vibration; Classification; Environmental factors; Warning signs; Hazards; Packaging; Protective containers; Systems analysis; Identification; Labeling Freight transportation; Shock (mechanics)

HS-010 748 Fld. 4/1; 4/6

SUBCOMMITTEE ON SCOPE, JURISDICTION AND ENFORCEMENT. FIRST REPORT

National Com. on Uniform Traf. Laws and Ordinances

1971 281p 108 refs

Bound with *Motor Vehicle Crash Losses and their Compensation in the United States, a Report to the Congress and the President*, by John A. Volpe, announced as HS-009 230.

Recommendations for proposed changes in the Uniform Vehicle Code are given, together with a summary of state laws comparable to each proposed revision. The revisions deal with problems of insurance, liability, drinking drivers, definitions of terms, and traffic rules. The Volpe report deals with accident compensation. Aspects discussed include the fault system, alternatives to tort liability, and recommendations for change.

Search terms: Traffic laws; Uniform Vehicle Code; Vehicle laws; State laws; Accident costs; Accident compensation; Law uniformity; Injury compensation; Insurance laws; Insurance industry; Alcohol laws; Nomenclature; Torts; Liability; Drinking drivers; Fault; No fault insurance plan

4/7 Mathematical Sciences

HS-010 749 Fld. 4/7; 3/4

MATHEMATICAL BIOLOGY OF AUTOMOBILE DRIVING. PT. 4

by N. Rashevsky

Published in *Bulletin of Mathematical Biophysics* v32 p71-8 (Mar 1970)

4/6 Mathematical Sciences (Cont'd.)
HS-010 749 (Cont'd.)

nd 17 refs

Grant PHS-GM-12032

Previous studies by this author of the mathematical biology of automobile driving have emphasized only the biological aspects, except for such mechanical factors as the size of the car. Otherwise, the ideal case of an inertialess car was considered. In this paper the first step is made toward introducing the effects of the mass of the car and the side-slip of the tires when the direction of driving is even slightly altered and combining these with the previously studied biological aspects. Some tentative comparisons with available data are made.

Search terms: Collision avoidance; Driver reaction time; Cybernetics; Man machine systems; Mathematical models; Mathematical analysis; Inertial forces; Equations of motion; Tire side forces

5/0 VEHICLE SAFETY

5/1 Brake Systems

HS-010 750 Fld. 5/1

PASSENGER-CAR SKID CONTROL—THE SENSOR—WHAT KIND OF EYES?

Published in *Automotive Engineering* v78 n9 unpagd (Sep 1970)

nd 4p

A number of sensing devices that could be used in a vehicle anti-skid system are described and their limitations and weaknesses pinpointed. Included and briefly discussed are the inertia switch, electromagnetic sensor, light sensitive transistor, fluidic sensor, hydraulic sensor, strain gauges, and proximity detector.

Search terms: Skid control; Sensors; Wheel locking; Antiskid devices

HS-010 751 Fld. 5/1; 5/18; 5/9

BREMSPRUFGERATE—STOSS-DAMPFER—KONTROLLGERATE

(BRACKETESTERS AND EQUIPMENT FOR TESTING SHOCK-ABSORBERS)

by H. Schmachtenberg

Technischer Überwachungsverein Rheinland (W. Ger.)

Published in HS-010 778, *Conference on Road Safety. Vol. 3. Technical Inspection of Vehicles*, Brussels, 1968 pB10-(1-38)

nd

Text in German. Summaries in English, French, and Dutch.

In the past, the working of brakes was studied by means of measuring instruments fitted in the vehicle; today one makes an almost exclusive use of brake testers, of which two types exist: platform testers and roller testers. When studying the braking of empty or half-loaded vehicles, involved calculation is necessary in order to judge the braking performance of the completely loaded vehicle. Until now the measuring instruments for testing shock-absorbers could only test them unmounted. As this method is inapplicable in ordinary inspection work, a measuring instrument is being developed which will allow the testing of shock absorbers, while leaving them mounted on the vehicle.

Search terms: Vehicle inspection; Brake inspection; Suspension system inspection; Shock absorber tests; Inspection equipment; Inspection stations; Braking recorders; Measuring instruments; Test equipment; Brake tests; Loads (forces); West Germany

5/2 Buses, School Buses, and Multipurpose Passenger Vehicles

HS-010 752 Fld. 5/2

A SURVEY OF NOISE LEVELS IN PUBLIC SERVICE VEHICLES

by C. H. G. Mills; D. T. Aspinall; D. C. Lavender; J. West

Motor Industry Res. Assoc. (England)

1969 25p 20 refs

Report no. MIRA-1969/14

Noise levels were recorded in various public-service buses for different routes, city and suburban services, and intercity routes and tours. Noise-time distributions for all types of service and typical sound levels and exposures are presented. The effect of many additional variables, such as driver performance, one-man operation, and coach-builder/chassis-manufacturer combinations were also investigated. Some consideration was also given to the noise levels in other forms of land transport and to factors other than noise that may affect passenger comfort. The results are summarized in the form of typical exposures for average vehicles on average journeys, and it is shown that the in-service noise can be reasonably predicted by a simple rating test based on full-throttle acceleration up to governed speed. The possibility of applying speech-interference criteria to suggest limits for the maximum noise in passenger service vehicles is discussed.

Search terms: Buses; Vehicle noise; Acoustic measurement; Noise control; Noise exposure; Noise standards; Comfort; Public transportation; Engine noise; Histograms; Traffic noise; Intelligibility; Speech

HS-010 753 Fld. 5/2; 4/8

THE EVOLUTION OF THE MOTOR BUS AS A TRANSPORT MODE

by John B. Rae

Published in *High Speed Ground Transportation Journal* v5 n2 p221-35 (Summer 1971)

nd 35 refs

Presented at the American Society of Mechanical Engineers meeting on transportation history, Los Angeles, 12 Oct 1970.

A steam carriage was used in London as early as 1801. Highway building in the

United States in the 1920's made intercity buses popular against rail and automobile competition. Bus size approached practical limits by the 1960's, with nominal capacity of 50 people. Despite toll roads and freeways built after World War II, intercity bus travel steadily declined as air travel boomed. Within cities, bus travel is the predominant form of public transportation, but patronage has fallen. More efficient bus service can result from reserved lanes, recessed bus bays, dual mode buses using transit tracks, computer scheduling, and demand scheduling.

Search terms: Buses; Bus lanes; Busways; Public transportation; Bus design; History; Bus usage; Travel modes; Modal choice; Demand scheduled buses; Public transportation usage; Dual mode vehicles

5/4 Design

HS-010 754 Fld. 5/4

DEVELOPMENT OF NEW SOLDER ALLOYS FOR AUTOMOTIVE APPLICATION

by R. E. Beal

IIT Res. Inst.

1972 16p 9refs.

Report no. SAE-720011

Sponsored by Copper Development Assoc., Inc. Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Automotive radiators are currently used near their maximum operating capabilities. New temperature and pressure demands require stronger soldered joints to prevent failures. Quantitative data demonstrate a direct relation between soldering parameters and mechanical properties. Several new solders and conventional alloys have been examined. Highest strengths are achieved with silver-bearing solders, especially at elevated temperatures. A new alloy with 3.0-3.8Sn, 1.2-1.5Ag, balance Pb,

showed 100% strength improvement which should raise current reliability and make the soldered radiator viable at higher operating temperatures and pressures.

Search terms: Radiators; Radiator failures; Solders; Engine operating conditions; Copper alloys; Soldering; Fracture mechanics; Temperature

AVAILABILITY: SAE

HS-010 755 Fld. 5/4

A STUDY OF THE VIBRATION AND ACOUSTIC CHARACTERISTICS OF SALOON CAR BODIES

by J. W. Dunn; D. T. Aspinall

Motor Industry Res. Assoc. (England)

1969 17p 5refs

Report no. MIRA-1969/15

Sedan car bodies were studied, principally in the range of 30 to 130 Hz, with single-point excitation produced by a small electromagnetic vibrator. Measurement of driving point mobility obtained at these points showed considerable variation, as much as 30 dB in average mobility level, depending on whether the point of application of the vibrator was a rigid or flexible part of the body structure. The very light damping of the structure was apparent in the dynamic range of mobility, which exceeded 50 dB. Pictures of a number of mode shapes and the associated sound level distribution in the passenger compartment were obtained. The average velocity of the radiating surfaces of the structure in each low frequency mode plotted against sound pressure level showed reasonable agreement with a theoretical curve. Measurements of the response of the structure were also obtained using narrow band random vibration to reduce the effect of resonances. It is concluded that achieving fundamental change in low frequency noise in vehicles will

require gross changes either in the structure or the means of vibration isolation.

Search terms: Body design; Vibration analysis; Vibration response; Vibration tests; Vehicle noise; Noise control; Acoustic measurement; Automobile bodies; Mathematical models

HS-010 756 Fld. 5/4; 1/2

BIOMECHANICAL PROBLEMS RELATED TO VEHICLE IMPACT

by Nicholas Perrone

Office of Naval Res.

1970 31p 30refs

Presented at Symposium on the Foundations and Objectives of Biomechanics, San Diego, July 1970.

An overview of the gross dimensions of the national problem of vehicle impact is presented. Although light aircraft are considered tangentially, primary attention is devoted to problems related to automobile impact. A number of specific biomechanical problems are enumerated; some are currently the subject of active research studies while the remainder represent new areas for future research. Impact attenuation relative to vehicle impact, being of critical importance, is also examined. The essential technical difficulties in analyzing for impact attenuation are reviewed and possible solutions offered. The relationship between body injury and vehicle damage is examined. The essence of the vehicle design problem is to minimize or even negate the effects of impact. Energy absorbing systems such as air bags are discussed.

Search terms: Impact caused injuries; Occupant protection; Fatality rates; Instrument panel caused injuries; Head injuries; Impact forces; Damage severity; Mathematical models; Impact protection; Automobile design; Safety design; Brain injuries; Chest injuries; Energy absorbing systems; Crashworthiness; Air bag restraint systems;

5/4 Design (Cont'd.)

HS-010 756 (Cont'd.)

Secondary collisions; Biomechanics;
Injury research; Impact attenuation;
Injuries by body area

HS-010 757 Fld. 5/4

A WATER-ACTIVATED LEAD-ACID DRY-CHARGED BATTERY

by John P. Badger

Prestolite Co.

1972 16p
Report no. SAE-720040

Presented at Automotive Engineering
Congress, Detroit, 10-14 Jan 1972.

A water-activable, dry-charged lead-acid automotive battery is described in which concentrated sulfuric acid is immobilized and stored in a phenolic foam block within each cell. Design and construction features are described, and the method of activating the battery with water is outlined. Battery performance is described, and shelf life is measured by comparing precharge performance of the water-activable battery with that of a conventional design as a function of battery age. The new fiberglass reinforced polyethylene thin-wall battery container is described. Physical properties are compared with typical copolymer and hard rubber containers.

Search terms: Dry charged batteries;
Lead acid batteries; Battery design;
Structural foams; Battery life; Battery
cases; Physical properties; Sulfuric
acid; Performance characteristics

AVAILABILITY: SAE

HS-010 758 Fld. 5/4

A NEW MANUFACTURING METHOD FOR LEAD-ACID STORAGE BATTERIES

by V. M. Halsall; R. R. Wiethaup

Globe-Union Inc.

1972 8p 6 refs
Report no. SAE-720041

Presented at Automotive Engineering
Congress, Detroit, 10-14 Jan 1972.

A new process for the preparation of lead-acid batteries has been developed in response to problems associated with inventory maintenance of wet batteries and the processing and performance of dry charge batteries. Unique steps are a modified formation treatment followed by removal of most of the electrolyte by the use of an accelerative force, such as that generated by a centrifuge, to produce a charged and tested finished battery in a moist condition. The new product has superior properties that enable the manufacturer to store and activate it within the battery plant to service the wet battery market or to ship it to the dry charge market as a high-performance long-shelf-life product.

Search terms: Lead acid batteries; Dry
charged batteries; Battery life; Electro-
lytes; Physical properties; Battery
charging

AVAILABILITY: SAE

HS-010 759 Fld. 5/4

APPLICATIONS AND PROPERTIES OF A SPECIALLY PROCESSED NITROGENIZED AISI 1010 STEEL WITH CONSIDERATION OF STRENGTH IN A COMPLETED VEHICLE

by Bernard S. Levy

Inland Steel Res. Labs.

1972 8p 6 refs
Report no. SAE-720017

Presented at Automotive Engineering
Congress, Detroit, 10-14 Jan 1972.

The static and dynamic strength properties and the fabricability of a specially processed, nitrogenized AISI 1010 steel are discussed. Typical applications are

presented, and it is indicated that one important area of application for this steel is in parts that preserve the integrity of the passenger compartment to enhance safety. In addition, a method is described by which an estimate can be made of the static strength of the steel after it has been fabricated and installed in a vehicle.

Search terms: Steels; Dynamic loads;
Welding; Static loads

AVAILABILITY: SAE

HS-010 760 Fld. 5/4

SPACE-AGE METALS FOR CARS

by Erik Neilssen

Published in *Autocar* v134 n3907 p16-9
(11 Feb 1971)

nd

Aerospace materials like titanium and beryllium are now being used in racing cars. The advantages of these metals and their uses in various automotive parts are described.

Search terms: Metals; Titanium; Beryl-
lium; Racing automobiles; High
powered engines; Automobile ma-
terials

HS-010 761 Fld. 5/4

A STUDY OF EROSION-CORROSION IN ALUMINUM RADIATOR ALLOYS BY JET IMPINGEMENT

by W. H. Anthony; J. M. Popplewell

Olin Corp.

1972 10p 4 refs
Report no. SAE-720009

Presented at Automotive Engineering
Congress, Detroit, 10-14 Jan 1972.

The frequent occurrence of erosion-corrosion attack in service failures of

aluminum radiators suggests the need for a rapid test which will predict erosion-corrosion susceptibility in aluminum alloys under conditions simulating those in an actual radiator. This paper describes a multijet test apparatus which has been used to compare the erosion-corrosion resistance of aluminum alloys in antifreeze solutions at 200 F. Impingement velocities of up to 130 ft/s have been used. The effect of short-term jet impingement has been found to produce a mode of erosion-corrosion attack similar to that found in 6951 alloy radiator after 40,000 miles of service. Attack appears to progress through several distinct stages starting with the development of a high density of pits which eventually become coalesced together at points of very high impingement velocity. The rate of attack has been found to be dependent on alloy composition and properties, jet velocity, and metal surface condition. The test would indicate that the susceptibility of aluminum radiator alloys to erosion-corrosion failure can be predicted by the effects of high-speed antifreeze jets produced with the equipment described.

Search terms: Aluminum alloys; Aluminum radiators; Corrosion; Corrosion tests; Test equipment; Radiator failures; Antifreezes; Pitting

AVAILABILITY: SAE

HS-010 762 Fld. 5/4

PISTON COOLING

by C. C. J. French

Ricardo and Co. Engineers Ltd.

1972 18p 7 refs
Report no. SAE-720024

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Detailed results which may be used for design purposes are presented comparing the effectiveness of alternative methods

of piston cooling for highly rated engines. These results, which have been obtained from rig and engine-running investigations covering a wide range of variables, are not found to be adequately correlated by existing pipe flow heat transfer equations, which are given. Details of how to choose a cooling method are presented.

Search terms: Heat transfer; Engine operating conditions; Pistons; High powered engines; Cooling systems; Diesel engines; Engine design; Engine tests; Engine performance; Thermocouples; Reynolds number; Mathematical analysis

AVAILABILITY: SAE

HS-010 763 Fld. 5/4

RADIANT HEAT TRANSFER IN DIESEL ENGINES

Tatsu Oguri; Shigewo Inaba

Yokohama National Univ. (Japan)

1972 20p
Report no. SAE-720023

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Heat transfer from gases to the wall of the combustion chamber of a diesel engine consists of two modes of heat transmission: convection and radiation. The quantitative relation between the two components has been directly measured only to a small extent in diesel engines. In order to prepare the derivation of an equation that would express more accurately the instantaneous heat transfer rate, the heat flux at each crank angle flowed from the gases to the cylinder wall was measured experimentally in diesel engines. The radiant heat flux was extracted from the above-mentioned total heat flux by using a thermocouple covered with a sapphire window. Integrating the instantaneous values of both radiant and total heat fluxes, the ratio of the former flux to

the latter was determined versus the value of indicated mean effective pressure.

Search terms: Heat transfer; Diesel engines; Equations; Thermocouples; Heat flux; Convection; Radiation; Operating temperature; Mathematical analysis; Combustion chambers

AVAILABILITY: SAE

HS-010 764 Fld. 5/4

AN EXPERIMENTAL DETERMINATION OF THE INSTANTANEOUS POTENTIAL RADIANT HEAT TRANSFER WITHIN AN OPERATING DIESEL ENGINE

by P. Flynn; Masatake Mizusawa; O. A. Uyehara; P. S. Myers

Cummins Engine Co., Inc.; Komatsu Ltd. (Japan); Wisconsin Univ.

1972 32p 29 refs
Report no. SAE-720022

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

An instrument was developed to measure absolute monochromatic infrared emission rates within an operating diesel engine. The instrument and data reduction system were developed for use in obtaining potential instantaneous rates of radiant heat transfer within an operating engine. Data are presented for variations of: engine speed, fuel-air ratio, fuel injection timing, intake air pressure, fuel injector nozzle spray patterns, fuel cetane numbers, fuel family, and fuel additives (tetraethyl lead and amyl nitrate). Also presented is an empirical correlation for instantaneous radiant heat transfer rates and some conclusions regarding radiant emission sources within the engine and their relationships to combustion processes.

Search terms: Heat transfer; Measuring instruments; Diesel engines; Engine operating conditions; Engine speeds;

5/4 Design (Cont'd.)

HS-010 764 (Cont'd.)

Air fuel ratio; Fuel injection; Air pressure; Fuel sprays; Cetane number; Fuel additives; Tetraethyl lead; Amyl nitrate; Combustion; Engine performance; Infrared scanning; Emission tests; Nozzles; Mathematical analysis; Operating temperature

AVAILABILITY: SAE

HS-010 765 Fld. 5/4

NEW LIGHT-WEIGHT DESIGN
COPPER AND BRASS RADI-
ATOR PERFORMANCE COM-
PARED WITH PRODUCTION
RADIATORS

by F. Lustwerk; Robert Batson

Lytron, Inc.

1972 9p

Report no. SAE-720012

Presented at Automotive Engineering
Congress, Detroit, 10-14 Jan 1972.

As part of a continuing program to improve performance of copper and brass radiators and thus obtain improved material utilization, heat transfer performance of a standard cross-flow automobile radiator and stresses existing during operation were measured under normal operating conditions and at various other temperatures and pressures. The standard radiator performance was evaluated using brittle coat testing, strain gauges located at a number of points on the surface, and thermocouples at many points on the radiator surface. Measurements were made under various air flow, air temperature, coolant flow, coolant temperature, and pressure conditions. Knowledge gained from the data obtained in the series of tests was applied to the design and construction of a new radiator intended for use on a prototype automobile. The new radiator has cylindrical tanks and a single deep tube row. Preliminary results show that peak stresses in the new radiator are

reduced by a factor of about 6 compared to the standard radiator. Thus, the new radiator can be operated at 22 psig while stresses in the standard radiator exceeded the yield point at this operating pressure. The new design will permit operation at far higher pressure levels with substantially hydrostatic conditions in the radiator.

Search terms: Radiator design; Heat transfer; Strain gauges; Stress measurement; Thermocouples; Operating pressure; Performance tests; Copper Brasses; Coatings; Air flow; Ambient temperatures; Coolant temperature

AVAILABILITY: SAE

HS-010 766 Fld. 5/4

INTERSTITIAL FREE SHEET
STEEL—APPLICATIONS AND
PERFORMANCE

J. A. Elias; R. E. Hook

Armco Steel Corp.

1972 5p 2 refs

Report no. SAE-720018

Presented at Automotive Engineering
Congress, Detroit, 10-14 Jan 1972.

Interstitial free sheet steel containing columbium (niobium) has been used in a variety of difficult deep drawing applications in the automotive and appliance industries. Performance data have shown a significant increase in deep drawability for this steel over drawing quality aluminum-killed steel. Breakage rates in difficult deep drawn parts have been reduced, often dramatically. One or more anneals between draws have been eliminated and better finished parts have been formed. Laboratory research trials have shown that one or more drawing steps of a multistage draw can be eliminated in a complex part.

Search terms: Laboratory tests; Interstitial free steels; Drawing (metal working); Annealing; Steel making

AVAILABILITY: SAE

HS-010 767 Fld. 5/4; 4/6; 4/1

AUTOMOBILE BUMPERS:
THEY'RE NOT WORKING

by Bob Crane

Published in *California Highway Patrolman* v35 n7 p4-5, 20-3, 26-7, 30-31 (Sep 1971)

nd

Some six billion dollars will be lost in automobile accident damage in 1971, much of it in low-speed crashes that resulted in costly structural damage. Safety experts see no basic incompatibility between designing cars for damage reduction and for occupant safety. The federal safety standard for 1973 will require bumpers to protect only safety-related parts—fuel, cooling, exhaust, lighting, and door, hood, and trunk latches. The auto industry says costs of safety bumpers will be high; others say that no-damage, 5 mph bumpers have been feasible for years.

Search terms: Bumper design; Bumper failures; Energy absorbing bumpers; Low speed impact tests; Collisions; Damage costs; Crashworthiness; Automotive parts industry; Insurance costs

HS-010 768 Fld. 5/4; 4/7

SPREAD—A COMPUTER PRO-
GRAM FOR DESIGNING FLAT
SPRINGS

by John R. Wolberg; Eric H. Nickerson

Technion—Israel Inst. of Tech.; Burndy Corp.

1972 5p 2 refs

Report no. SAE-720016

Presented at Automotive Engineering
Congress, Detroit, 10-14 Jan 1972.

SPREAD allows the user to perform complex stress and force analysis with

little or no mathematical or computer experience. Extensive use of the program has shown that the resulting springs are much less prone to redesign than springs designed in the classical manner. The designs are usually more efficient, and the resulting product is closer to optimum when the program is used. The total savings in time, money, and effort has often been dramatic.

Search terms: Spring design; Stress analysis; Computerized simulation; Spring Evaluation Analysis and Design Program

AVAILABILITY: SAE

HS-010 769 Fld. 5/4; 5/1

ELECTROSTATIC CLUTCHES AND BRAKES. PT. 1. PRINCIPLES AND PRACTICAL DESIGN. PT. 2. APPLICATIONS AND CONTROL CIRCUITS

by R. W. Dudding

Published in *Electrical Review* v182 p322-4 (1 Mar 1968); v182 p359-60 (8 Mar 1968)

nd 9 refs

Principles, design, applications, and control circuits are described for electrostatic units with very rapid response and low control-power requirements. Electrostatic clutches were impractical until high-strength carbon materials of controlled resistivity were produced from cellulose. The materials have low-wear, self lubricating characteristics when used as rubbing members with steel. Electrostatic coupling devices avoid the problem of voltage surge resulting from collapse of an electromagnetic field and can operate from alternating or direct currents of a few hundred volts.

Search terms: Clutches; Motion effects; Brake materials; Torque; Control equipment; Disc brakes; Band brakes; Mathematical analysis; Surge; Loads; (forces)

HS-010 770 Fld. 5/4; 5/6

ENGINE FUEL RATE TO COMPUTED IN-VEHICLE HORSEPOWER

by A. Byron Niles; William J. Gardner

Caterpillar Tractor Co.

1971 9p 16 refs

Report no. SAE-710701

Presented at the National Farm, Construction and Industrial Machinery Meeting, Milwaukee, 13-16 Sep 1971.

This paper describes an accurate instrument system developed to determine in-vehicle horsepower. Rapid measurement of fuel rate used in conjunction with a computer to factor in the brake specific fuel consumption and other variables produces an almost instantaneous display of developed horsepower. The system can be applied to boats and motor-generator sets as well as land vehicles.

Search terms: Engine performance; Engine tests; Horsepower; Fuel consumption; Test equipment; Computerized test methods; Transducers; Marine engines; Heavy duty vehicles

AVAILABILITY: SAE

5/6 Fuel Systems

HS-010 771 Fld. 5/6

FUEL FACTORS IN AUTOMOTIVE TAILPIPE EMISSIONS

by W. E. Rinehart; S. A. Gendernalik; L. F. Gilbert

Published in *Journal of the American Industrial Hygiene Association* v32 p179-87 (Mar 1971)

nd 25 refs

Existing information on exhaust emissions from the literature has been coupled with previously unpublished

data to develop a summary of the effects of fuel composition of emissions. For fuels of present hydrocarbon composition but without lead antiknocks, there may be some increases in emission of carbon monoxide (due to increased fuel consumption resulting from lower compression ratios) and aldehydes (due to lead removal), coupled with a decrease in particulates. For aromatic-enriched fuels of present-day octane number but without lead antiknocks, there are dramatic increases in reactive hydrocarbons, polynuclear aromatics, and aromatic aldehydes—all of which may be considered detrimental to the environment. The conclusion is that overall fuel factors are such that the elimination of lead anti-knock from fuels would not result in environmental improvement and will result in an increase of certain important environmental contaminants.

Search terms: Vehicle air pollution; Exhaust emissions; Air pollutants; Aromatic compounds; Octane requirements; Hydrocarbons; Aldehydes; Compression ratio; Carbon monoxide; Nitrogen oxides; Particulate air pollutants; Leaded gasoline; Air pollution emission factors; Fuel composition; Environmental factors; Air pollution effect on health; Exhaust effect on health

HS-010 772 Fld. 5/6

CLEANING UP AUTOMOTIVE EMISSIONS

by Anonymous

Published in *Du Pont Magazine* p6-9 (Jul-Aug 1970)

nd

Du Pont's exhaust manifold reactor system is described. The system is a noncatalytic unit which oxidizes hydrocarbons and carbon monoxide in the reactor at 1,650°F. Economy and performance are affected only slightly by the installation, which meets proposed

5/6 Fuel Systems (Cont'd.)

HS-010 772 (Cont'd.)

1975 emission standards right now, and should meet more stringent 1980 goals.

Search terms: Exhaust manifold reactors; Thermal reactors; Exhaust emission standards; Exhaust emission control devices; Carbon monoxide; Hydrocarbons; Nitrogen oxides; Particulate air pollutants

HS-010 773 Fld. 5/6

CONFERENCE ON AIRCRAFT AND THE ENVIRONMENT, WASHINGTON, D. C., FEB. 8-10, 1971. PROCEEDINGS. PT. 1

Society of Automotive Engineers, Inc.; Department of Transp.

1971 308p refs
Report no. SAE-P-37

Includes 32 SAE papers numbered within SAE-710305 through 710353.

Subjects included in the proceedings deal with: acoustical engineers; sonic boom; noise reduction; aircraft noise; airport-community interface; airport noise; land use; gas turbine engines; the SST and air quality; airports and environmental control; water vapor pollution of the upper atmosphere by aircraft; air pollution at airports; dispersion modeling of airport pollution; government regulation of aircraft noise; aircraft pollutant emissions; environmental aspects of air transportation.

Search terms: Acoustics; Noise control; Land usage; Aircraft noise; Environmental factors; Noise exposure; Acoustic measurement; Noise standards; Noise tolerances; Air quality standards; Supersonic transport; Aircraft air pollution; Airports; Jet engine exhaust emissions; Environmental planning; Community support; Air pollution laws; Gas turbine engines; Sonic boom

AVAILABILITY: SAE

HS-010 774 Fld. 5/6

DETERMINING THE COSTS OF AIR POLLUTION CONTROL

by W. E. Jackson; H. C. Wohlers; W. DeCoursey

Published in *Journal of the Air Pollution Control Association* v19 n12 p917-23 (Dec 1969)

nd 16 refs

A general procedure is described that can be followed for estimating the cost of reducing air pollution emissions within a metropolitan region. The six step procedure examines emission inventories, regional trends, control trends, alternate control schemes, control costs, and optimum cost-effectiveness. The procedure is illustrated for automobile emissions in the Delaware Valley. By application of feasible controls, automobile emissions are shown to be reduced from 4.5 billion pounds per year during 1968 to a predicted 1.5 billion pounds in the year 2000. Annual control costs during the same period will increase from \$30 million to over \$300 million. A method is illustrated for determining cost to achieve any desired degree of emission reduction where alternate feasible control schemes are available.

Search terms: Vehicle air pollution; Regional airsheds; Air pollution control; Air pollution control costs; Systems analysis; Vehicle age; Benefit cost analysis; Air pollution emission factors; Forecasting; Regional planning

HS-010 775 Fld. 5/6; 3/8

CARBON MONOXIDE: ASSOCIATION OF COMMUNITY AIR POLLUTION WITH MORTALITY

by Alfred C. Hexter; John R. Goldsmith

Published in *Science* v172 n3980 p265-7 (16 Apr 1971)

nd 6 refs

Regression analysis of daily mortality in Los Angeles County for 1962-5 shows that there is a significant association between community carbon monoxide concentrations and mortality. Cyclic variation and maximum temperature were the main contributors. No association was demonstrated between total oxidants and mortality.

Search terms: Air pollution effect on health; Exhaust effect on health; Carbon monoxide poisoning; Health hazards; Air pollutant exposure tolerances; Regression analysis; Regional airsheds; Los Angeles; Fatality causes; Temperature; Linear regression analysis; Environmental factors

HS-010 776 Fld. 5/6; 5/15

WHITEWASHING DETROIT'S DIRTY ENGINE

by John Wicklein

Published in *Washington Monthly* v2 p10-20 (Jun 1970)

nd

It is suggested that the internal combustion engine is a major air pollution cause and a health hazard and that it cannot be cleaned up enough to be satisfactory. The automotive industry is criticized for failure to deal with the problem sooner and for failure to develop alternatives such as steam and gas turbines. Governmental action is urged to force abandonment of the internal combustion engine.

Search terms: Internal combustion engines; Exhaust effect on health; Air pollution emission factors; Exhaust emission standards; Gas turbine engines; Automotive industry general attacks; Vehicle air pollution; Health hazards; Air pollution effect on health; Federal control

5/9 Inspection

HS-010 777 Fld. 5/9; 4/3

PERIODIC MOTOR VEHICLE INSPECTION IN IRELAND. AN APPRAISAL AND WORK PROGRAMME OUTLINE

by D. O'Sullivan

Published in *Technical Aspects of Road Safety* n44-45 p2.1-2.60 (Mar 1971)

nd 52 refs

Presented at a joint meeting of the Institution of Engineers of Ireland and the Institution of Mechanical Engineers, Dublin, Jan 1971.

The objectives of periodic motor vehicle inspection are outlined and the present international position with regard to this requirement examined. The data relating to vehicle defects as found in motor vehicles involved in accidents are critically evaluated and various studies which have been undertaken with a view to determining the effectiveness of periodic motor vehicle inspection are reviewed. The likely costs and benefits of such a program in the Irish context are estimated. Criticisms of cost benefit estimates are discussed. Alternative program possibilities are analyzed insofar as present data permit, and it is shown that vital information is missing. Means of establishing inspection effectiveness include accident rate studies before and after inspection and probability analysis of defective vehicle accident involvement.

Search terms: Vehicle inspection; Defective vehicles; Benefit cost analysis; Statistical analysis; Ireland; Inspection effectiveness; Accident rates; International factors; Accident risk forecasting; Probability theory; Accident factors

HS-010 778 Fld. 5/9

CONFERENCE ON ROAD SAFETY. VOL. 3. TECHNICAL INSPECTION OF VEHICLES

Fonds d'Etudes et de Rech. p.1a Sec. Rout. (Bel.)

1968 214p

Text in English, French, German, and Dutch. Includes HS-010 751 and HS-010 779 788.

This volume consists of studies made in various countries of aiming, testing, and regulations for vehicle lights; statistical and computer processing of inspection data; annual inspection of motor vehicles; inspection of accident damaged vehicles after repairs; noise and smoke measurement in inspection stations; measurement of carbon monoxide in exhaust during inspection; training of personnel for vehicle inspection and driver licensing; inspection of new vehicles and defects found; vehicle type-approval testing; brake and shock absorber testing; vehicle inspection statistics.

Search terms: Vehicle inspection; Vehicle lighting; Vehicle safety standards; Inspector training; Defective vehicles; Automobile repair; Inspection costs; Inspection stations; Inspection records; Inspection effectiveness; Data processing; Noise measurement; Exhaust emission tests; International factors; Brake tests; Defects

HS-010 779 Fld. 5/9; 4/5

EXPLOITATION STATISTIQUE DES DONNEES DU CONTROLE TECHNIQUE EN BELGIQUE (STATISTICAL PROCESSING OF TECHNICAL INSPECTION DATA IN BELGIUM)

by Albert Halleux, Sr.

Autosecurite (Belgium)

Published in HS-010 778, *Conference on Road Safety. Vol. 3. Technical Inspection of Vehicles*, Brussels, 1968 pB2-(1-27)

nd

Text in French. Summaries in English, French, Dutch, and German.

This paper describes research work undertaken in order to establish, in Belgium, permanent statistics about technical inspection of motor-vehicles. After having pointed out what information best characterizes the different aspects of technical inspection, the author describes the intermediate document devised for transmitting these data to the computer service. The different statistical statements these services can draw up are then described. Statistical statements based on information gathered during an experimental period of two months are given.

Search terms: Vehicle inspection; Inspection records; Computerized records management; Data processing; Data acquisition; Belgium; Systems analysis; Data reduction

HS-010 780 Fld. 5/9

PERIODIC INSPECTION OF MOTOR VEHICLES IN SWEDEN. ORGANIZATION AND STATISTICS

by Alexej Pellijeff

Svensk Bilprovning A.B. (Sweden)

Published in HS-010 778, *Conference on Road Safety. Vol. 3. Technical Inspection of Vehicles*, Brussels, 1968 pB3-(1-11)

ND

Text in English. Summaries in English, French, Dutch, and German.

Since January 1, 1965, all road vehicles in Sweden which are three years old or older are subject to annual compulsory inspection. In 1967, the Swedish Vehicle Inspection Company performed 1.8 million such inspections. The results of the annual compulsory inspection can be regarded as comprehensive reliability and durability test results for the various vehicles and components. Statistical surveys of the inspection results are published regularly by the company.

5/9 Inspection (Cont'd.)

HS-010 780 (Cont'd.)

These statistics have proved very valuable to manufacturers, garages, and vehicle owners.

Search terms: Vehicle inspection; Inspection records; Inspection stations; Sweden; Used automobiles; Reliability

HS-010 781 Fld. 5/9

ONDERZOEK VAN VOERTUIGEN, DIE IN EEN ONGEVAL ZWAAR BESCHADIGD WERDEN, NA HUN REPARATIE (INSPECTION, AFTER REPAIRS, OF VEHICLES WHICH SUFFERED CONSIDERABLE DAMAGE IN AN ACCIDENT)

by J. Van Rosevelt

Nederlandsche Toeristenbond (Netherlands)

Published in HS-010 778, *Conference on Road Safety. Vol. 3. Technical Inspection of Vehicles*, Brussels, 1968 pB4-(1-11)

nd

Text in Dutch. Summaries in English, French, Dutch, and German.

Netherlands inspection of the quality of repairs made on heavily accident-damaged vehicles is dealt with. Methods used for checking whether a seemingly intact car has or has not been severely damaged are described. The different inspection operations to be carried out are briefly described. A distinction is made between repairs paid for by the owner and repairs paid for by an insurance company. Statistical data are given about the rejection for technical reasons, when someone is buying a second-hand car or one which has been severely damaged in an accident.

Search terms: Netherlands; Automobile repair after accident; Vehicle inspection; Damage severity; Used

automobiles; Vehicle age; Inspection procedures; Insurance claims

HS-010 782 Fld. 5/9; 5/6

GELUIDS- EN ROOKMETING IN DE KEURINGSTATIONS (NOISE AND SMOKE MEASUREMENT IN INSPECTION STATIONS)

by H. Van Speybroeck

Studiebureel voor Automobielttransport (Belgium)

Published in HS-010 778, *Conference on Road Safety. Vol. 3. Technical Inspection of Vehicles*, Brussels, 1968 pB5(1-23)

nd 8 refs

Text in Dutch. Summaries in English, French, Dutch, and German.

The situation in Belgium, regarding the campaign against noise and against smoke, is described. As far as noise is concerned, vehicle prototypes are tested by the ISO reference method (vehicle in acceleration over 20 m), while a simplified method, applied near (75 m) the stationary vehicle, is to be used for police and for inspection station checks. For measuring diesel smoke opacity, light-absorption meters are used rather than the filter-paper type. Results obtained by different methods are compared and this leads to a call for better international collaboration.

Search terms: Vehicle inspection; Vehicle noise; Noise standards; Automobile models; Smoke; Belgium; International factors; Noise control; Diesel engine exhaust emissions

HS-010 783 Fld. 5/9; 5/6

PRUFUNG DER ABGASE BEI DER TECHNISCHEN UBERWACHUNG DER KRAFTFAHRZEUGE (EXAMINATION OF EXHAUST GASES IN THE COURSE OF TECHNICAL INSPECTION OF MOTOR VEHICLES)

by H. Weber

Technischer Überwachungsverein Essen (W. Germany)

Published in HS-010 778, *Conference on Road Safety. Vol. 3. Technical Inspection of Vehicles*, Brussels, 1968 pB6-(1-13)

nd 6 refs

Text in German. Summaries in English, French, Dutch, and German.

Limitation of the CO content of exhaust gases from idling petrol engines is a means of reducing air pollution. Research on this subject is reviewed. In order to ascertain whether the CO content does not exceed the limit-figure, instruments of adequate precision are needed. The instruments to be considered are described, and some important points of the test regulations are explained. Infra-red absorption instruments for measuring CO have been found to work with the precision required by the regulations. From CO measurements carried out on the inspection line, it may be concluded that they can be done there without excessive expense by technical inspection personnel.

Search terms: Vehicle inspection; Vehicle air pollution; Exhaust emissions measurement; Exhaust emission standards; Carbon monoxide; Infrared analyzers; West Germany; Air pollution control; Exhaust gases; Idling; Measuring instruments; Inspection procedures

HS-010 784 Fld. 5/9

LES PROBLEMES POSES PAR LA FORMATION DU PERSONNEL DES ORGANISMES D'INSPECTION AUTOMOBILE (THE PROBLEM OF TRAINING PERSONNEL FOR A TECHNICAL INSPECTION ORGANIZATION)

by M. Duchene

Groupement des Organismes de Contrôle Auto. (Bel.)

Published in HS-010 778, *Conference on Road Safety. Vol. 3. Technical Inspection of Vehicles*, Brussels, 1968 pB7-(1-7)

1

Text in French, Summaries in English, French, Dutch, and German.

The Belgian group of organizations for the technical inspection of motor vehicles has set up a center for the training of personnel. Technical inspection employees must have, in addition to the necessary technical knowledge, some knowledge of technical and administrative regulations and psychology. Their professional training is done in three cycles: two cycles of studies separated by a period of practice. Although at first the center only trained personnel for the technical inspection stations, they have now been given the task of training candidates for driver's license test examiners.

Search terms: Vehicle inspection; Inspector training; Driver license examiners; Curricula; Belgium

HS-010 785 Fld. 5/9

CONSIDERATIONS SUR L'INSPECTION TECHNIQUE DES VOITURES NEUVES AU GRAND-DUCHÉ DE LUXEMBOURG
NOTES ON THE TECHNICAL INSPECTION OF NEW CARS IN THE GRAND DUCHY OF LUXEMBURG)

Lucien Gloden

Ateliers de Contrôle Tech. pour Veh. Moto. (Lux.)

Published in HS-010 778, *Conference on Road Safety. Vol. 3. Technical Inspection of Vehicles*, Brussels, 1968 pB8-(1-7)

1

Text in French. Summaries in English, French, Dutch, and German.

All vehicles submitted for registration in the Grand Duchy must undergo technical inspection "before their first appearance on the road." The author deals in this article with vehicles fitted with less than ten seats and he gives statistics about the defects of the vehicles rejected in 1967. It is proved that, notwithstanding all examinations and verifications on the production line, it is possible for vehicles which are unfit for the road to leave the factories. It follows, that technical inspection of new vehicles is necessary for the safety of users and that this inspection will be best ensured and done most efficiently in an adequately equipped inspection station, working under government supervision.

Search terms: Vehicle inspection; Inspection laws; Manufacturing inspection; Automobile defects; Luxembourg; Quality control; Federal control

HS-010 786 Fld. 5/9; 5/17

ÜBER DAS WESEN UND DIE BEDEUTUNG DER TYPPRÜFUNG VON KRAFTFAHRZEUGEN UND DIE DABEI GEMachten ERFAHRUNGEN
(NATURE AND SIGNIFICANCE OF TYPE-APPROVAL OF MOTOR-VEHICLES AND EXPERIENCE GATHERED)

by Fromund Kaup

Technischer Überwachungsverein Bayern (W. Germany)

Published in HS-010 778, *Conference on Road Safety. Vol. 3. Technical Inspection of Vehicles*, Brussels, 1968 pB9-(1-28)

nd

Text in German. Summaries in English, French, Dutch, and German.

Practical examples show that approval tests really serve the cause of road safety and that they very effectively contribute

to the protection of persons and property. The part played by the officially recognized expert who does the type-approval testing is explained. As an expert, he is an intermediary between the legislator and the industrialist, but also between the latter and the driver. Thanks to him, the owner of the car can be certain that his vehicle conforms to the technical regulations and to the rules concerning its equipment.

Search terms: Vehicle inspection; Inspection effectiveness; Manufacturing inspection; West Germany; Fatality rates; Failures; Heavy duty vehicles

HS-010 787 Fld. 5/9

INSPECTION TECHNIQUE DES VEHICULES AUTOMOBILES EN COTE D'IVOIRE (TECHNICAL INSPECTION OF MOTOR-VEHICLES IN THE IVORY COAST)

by L. Aka

Published in HS-010 778, *Conference on Road Safety. Vol. 3. Technical Inspection of Vehicles*, Brussels, 1968 pB11-(1-22)

nd

Text in French. Summaries in English, French, Dutch, and German.

Technical inspection, as it is organized in the Ivory Coast with the help of an efficient concern, produces excellent results, the work being done without expense on the part of the government. Statistics about the evolution of vehicle defects show that the condition of vehicles is improving, especially where it concerns steering, brakes, chassis, axles, and lights. It is, however, impossible to know exactly in what proportion the influence of motor vehicle inspection has brought about a reduction of the accidents due to mechanical defects.

Search terms: Vehicle inspection; Inspection stations; Ivory Coast; Defects; Accident statistics; Brake inspection; Lamps; Inspection effectiveness

5/10 Lighting Systems

HS-010 788 Fld. 5/10; 5/9

LE PROBLEME DE L'EXAMEN OBJECTIF DES FEUX (VEHICLE LIGHTS—AIMING AND TEST- ING)

by J. B. Cornelis; J-P. de Coster

Auto Inspection Bureau Veritas (Belgium); Fonds d'Etudes et de Rech. p. 1a Sec. Rout. (Bel.)

Published in HS-010 778, *Conference on Road Safety. Vol. 3. Technical Inspection of Vehicles*, Brussels, 1968 pB1-(1-23)

nd

Text in French. Summaries in English, French, Dutch, and German.

Experience has shown that many vehicles have faulty lights. For example, out of several hundred new vehicles, 42% were found to have at least one badly aimed headlight. The percentage found for vehicles checked during the lighting campaigns of 1967 was 79.3%, whereas for vehicles undergoing compulsory technical inspection, it varied between 11.5% and 16%. Faced with this situation, the Belgian authorities enacted regulations on the setting of headlights and on the limit-figures for the intensity of other lights. These regulations are backed by standard NBN 611.1 as regards the setting and by standard NBN 612 relating to the instruments used for aiming headlights.

Search terms: Vehicle inspection; Vehicle lighting; Headlamp aiming; Headlamp tests; Headlamp regulations; Test equipment; Auxiliary lamps; Belgium; Lamp standards; Headlamp mounting height; Laboratory tests

5/11 Maintenance and Repairs

HS-010 789 Fld. 5/11; 5/1

INVESTIGATIONS INTO ALTERNATIVE FORMS OF CONTROL FOR DUST GENERATED DURING THE CLEANING OF BRAKE ASSEMBLIES AND DRUMS

by K. L. Knight; D. E. Hickish

Published in *Annals of Occupational Hygiene* v13 p37-9 (Jan 1970)

nd 1 ref

Presented at a Conference on Exposure to Asbestos during Brake and Clutch Maintenance, Brentwood, England, Mar 1969.

Methods of removing dust from brake drums and assemblies to allow inspection are described. The methods used were a vacuum funnel and a vacuum brush. The vacuum brush is recommended for reducing the operator's exposure to asbestos dust. It is also simpler, quicker, and easier to handle.

Search terms: Dust collection; Asbestos; Brake maintenance; Cleaning; Dust control; Brake inspection; Brake drums

5/14 Occupant Protection

HS-010 790 Fld. 5/14; 1/2

A PROPOSAL FOR PERSONNEL RESTRAINTS IN THE AUTOMOBILE

by Horace E. Campbell

Published in *Journal of Trauma* v10 n7 p611-5 (Jul 1970)

nd 11 refs

The crashing motorist must enter the decelerative situation in the erect posture for two reasons: there is no room in the automobile for noninjurious

jackknifing; in even moderate jackknifing, rupture of the diaphragm by the heavy abdominal organs and rupture of the heart or great vessels by blood-column displacement, may occur. The current two-inch shoulder strap represents a great advance, but in heavy crashes it imposes a high-energy load over a too-limited area. In experimental crashes upon pregnant baboons, the inverted-Y configuration proved the least traumatic. It is suggested that this configuration be supplemented by; a) a four-inch strap across the chest connecting the two shoulder straps; or b) a ten-inch connection extending from the suprasternal notch to below the xiphoid, employing a rugged heavy-duty zipper; or c) an extension of this structure overlapping the seat belt.

Search terms: Seat belt caused injuries; Abdominal injuries; Ruptures; Deceleration caused injuries; Injury severity; Seat belt medical factors; Shoulder harnesses; Three point restraint systems; Shoulder harness positioning; Injury case reports; Occupant protection; Seat belt positioning; Restraint system effectiveness

5/15 Propulsion Systems

HS-010 791 Fld. 5/15

WHY NOTHING WILL REPLACE THE INTERNAL-COMBUSTION ENGINE. . . RIGHT NOW

Anonymous

Published in *Machine Design* v41 n12 p38-40, 42, 44 (29 May 1969)

nd

General Motors special-purpose vehicles for urban transportation are described. They include steam, electric, and hybrid propulsion systems. An exceptionally stable three-wheeled experimental vehicle is discussed. Advantages and disadvantages of these cars are described.

Search terms: Urban automobiles; Experimental automobiles; Electric automobiles; Hybrid automobiles; Steam automobiles; Three wheel automobiles; Automobile performance; Automobile comparisons

HS-010 792 Fld. 5/15; 5/2

THE BROBECK STEAM BUS PROJECT

Anonymous

Published in *Light Steam Power* v20 n2 p59-64 (Mar-Apr 1971)

nd

A standard transit bus being converted to steam power is scheduled for demonstration service after September 1971 in Oakland, California. Required performance is to be the same as with the diesel engine, with minimum change in appearance and no increase in weight. The Doble/Besler technology is the basis for the steam generator and controls.

Search terms: Steam buses; California; Boilers; Steam engines

HS-010 793 Fld. 5/15; 5/4

THE TURBINE INTERSTAGE DIFFUSER

by Charles A. Amann; Gary E. Norden-son; Elias H. Razinsky

General Motors Res. Labs.

1971 12p 6 refs
Report no. SAE-710553

Presented at the SAE mid-year meeting, Montreal, 7-11 Jun 1971.

The incentive for use of an interstage diffuser in a free-shaft gas turbine engine is briefly examined and some published background data reviewed. Tests of two annular diffusers behind an upstream

turbine show the deleterious effects of turbine exit flow nonuniformity on diffuser behavior. The flow acceleration provided by the area contraction of a power turbine nozzle located at the diffuser exit substantially improves the nature of the flow previously found to exist at the diffuser exit in the absence of the nozzle.

Search terms: Gas turbine engines; Engine design; Engine tests; Aerodynamic configurations; Fluid flow; Diffusers; Nozzles

AVAILABILITY: SAE

5/18 Steering Control System

HS-010 794 Fld. 5/18

AERODYNAMIC TESTING OF VEHICLES AT MIRA

by R. G. S. White; G. W. Carr

Published in *Proceedings of the Institution of Mechanical Engineers* v182 pt3B p61-8 (1967-68)

nd
Report no. Paper-8

The Motor Industry Research Association has done considerable aerodynamic testing in full-scale and one-quarter scale wind tunnels. Drag coefficients of current model automobiles range from 0.33 to 0.56, although work at MIRA has shown that 0.25 is attainable. The second important aerodynamic effect is stability. A typical vehicle driving at 70 mph and subjected to a side wind of 25 mph will generate an aerodynamic side force of 177 lb. The neutral steer point will be to the rear of the aerodynamic center of pressure, which is undesirable. Techniques and facilities are described, as well as means for correlation with road tests.

Search terms: Vehicle dynamics; Body aerodynamics; Wind tunnel tests; Vehicle stability; Wind forces; Drag;

Pitch; Neutral steer; Aerodynamic configurations; Mathematical models; Yaw

HS-010 795 Fld. 5/18; 5/20; 4/7

A COMBINED EXPERIMENTAL AND ANALYTICAL PROCEDURE FOR IMPROVING AUTOMOTIVE SYSTEM DYNAMICS

by Albert L. Klosterman

Structural Dynamics Res. Corp.

1972 12p 10 refs
Report no. SAE-720093

Presented at Automotive Engineering Congress, Detroit, 10-14 Jan 1972.

Powerful capabilities for use in the analysis of complex automotive systems have recently been developed. These capabilities bring the newly developed electronic testing equipment together with the powerful computational techniques to perform a total system dynamic design analysis. The analysis tool developed is called the building block approach, whereby complex system behavior is defined by analyzing and combining the dynamic behavior of simpler components and subassemblies. The dynamic behavior of each component is obtained from a separate analytical investigation or from a specific type of experimental test procedure. Component data are then combined mathematically to predict dynamic behavior of the full system under the prescribed loading conditions. With the system simulation completed, design changes in any or all components can be evaluated. The effect of changes in any component on the operating behavior, vibration, noise, and stress can be ascertained. This paper describes the basic dynamic design analysis techniques which are available, and the automated testing methods and computer programs necessary to make the approach practical and successful. To demonstrate the application of this approach to automotive systems, the dynamic simulation of a heavy truck frame, cab, and cam mount system is described.

5/18 Steering Control System (Cont'd.)

HS-010 795 (Cont'd.)

Search terms: Systems analysis; Mathematical models; Dynamic models; Computerized simulation; Vehicle dynamics; Damping; Test equipment; Equations of motion; Mathematical analysis; Truck design; Vibration; Frequencies; Dynamic structural analysis

AVAILABILITY: SAE

5/20 Trucks and Trailers

HS-010 796 Fld. 5/20

WHAT YOU NEED TO KNOW BEFORE YOU BUY 4-WHEEL DRIVE

by Barry Lopez

Published in *Camping* p76-7, 137 (Mar 1971)

nd

Four-wheel drive can be thought of as an expensive option, used on the average only one mile in 29, but sometimes essential. Features of four-wheel drive vehicles described briefly are free-wheeling front hubs, mechanical and electric winches, special wide tires, protective skid plates, transfer cases, wheelbase, safety equipment, and gross vehicle weight.

Search terms: Four wheel drive vehicles; Recreational vehicles; Off the road vehicles; Campers (truck mounted); Vehicle stability; Vehicle characteristics

5/22 Wheel Systems

HS-010 797 Fld. 5/22

TREAD WEAR AND WET SKID RESISTANCE OF BUTADIENE-STYRENE ELASTOMERS AND BLENDS

by R. N. Kienle; E. S. Dizon; T. J. Brett; C. F. Eckert

Published in *Rubber Chemistry and Technology* v44 n4 p996-1014 (Sep 1971)

nd 16 refs

Presented at a meeting of the Division of Rubber Chemistry, American Chemical Society, Miami Beach, 27-30 Apr 1971.

Tread wear is a complex phenomenon determined by tread material, tire construction, and test conditions. In road testing, the car, wheel position, driver, inflation pressure, and shoulder drop (tread curvature) were controlled. Macrostructure variation (unlike microstructure) had no significant effect on wear. Wear rate within 80°C of glass-transition temperature is dominated by viscoelastic properties; at higher temperatures, wear is dominated by a material factor correlated with temperature. Skid distance on wet asphalt pavement is inversely related to wear rating. In the region of temperature where viscoelastic effects dominate wear, poor wear means good skid resistance, and vice versa.

Search terms: Butadienes; Butyl tires; Styrene; Polymers; Synthetic rubber; Elastomers; Road tests; Tire performance; Tire tests; Tire wear; Tire properties; Tire skid resistance; Wet skidding; Viscoelasticity; Wear tests; Tire temperature; Tire treads; Tire materials

HS-010 798 Fld. 5/22

THE RATE OF DEFLATION OF CAR TYRES

by R. J. Grogan; C. S. Murray

Published in *Journal of the Forensic Sciences Society* v9 p157-64 (Dec 1969)

nd

Tests with tires containing penetrations of various sizes to establish the rate of deflation are described. A simple law is deduced which may be used to calculate

the deflation rate of tires of different sizes. Some of the variables are discussed and their possible influence suggested. A method enabling the effective size of a penetration or leaking component to be determined is outlined.

Search terms: Tire tests; Tire cuts; Tire failures; Tire inflation pressure

HS-010 799 Fld. 5/22

RESEARCH FOR A UNIFORM QUALITY GRADING SYSTEM FOR TIRES. 5. EFFECT OF ENVIRONMENT ON TREAD WEAR RATE

by F. C. Brenner; A. Kondo; G. E. Cohen

Published in *Rubber Chemistry and Technology* v44 n4 p952-9 (Sep 1971)

nd 9 refs

Contract FH-11-6090

This paper analyzes a previously reported series of tests to develop a tread wear rating procedure and reports an additional study. In tests with bias ply, belted bias, and radial commercial passenger car tires, it was found that the rate of wear does not change as the tires are worn. An explanation for the observation that tires wear faster on wet pavements has been proposed. The tire is more deformed passing through the contact patch on a wet surface than on a dry. In addition, the water, acting as a lubricant, reduces resistance to motion between surfaces of the cut rubber on the surface of the cutting asperity and the rubber.

Search terms: Tire tests; Tire wear; Bias belted tires; Radial tires; Tire grading; Tire wear measurement; Bias tires; Wet road conditions; Tire road contact forces; Environmental factors; Tire treads; Mileage

HS-010 800 Fld. 5/22

REAL LIFE SIMULATION—A CHALLENGE TO OVER-THE-ROAD TIRE TESTING

by H. C. Hodges

Published in *Materials Research and Standards* v8 n6 p20-6 (Jun 1968)

nd

Profiles of tire performance through a meaningful range of test environments are required today to meet the expanding need for fast, accurate data in order to protect product lead time. Characteristic data from a number of test programs illustrate the need for expanding test simulators rather than concentrating on single phase test programs. Instrumentation to identify environmental variables in addition to accepted test constants has become essential to the development of meaningful test simulators.

Search terms: Tire performance; Tire characteristics; Tire tests; Tire test equipment; Tire wear; Tire pavement interface; Tire manufacture

HS-010 801 Fld. 5/22; 5/18

AERODYNAMIC CHARACTERISTICS OF EXPOSED ROTATING WHEELS

by W. R. Stapleford; G. W. Carr

Motor Industry Res. Assoc. (England)

1969 22p 10 refs

Report no. MIRA-1970/2

A model consisting of a very slender body with four wheels, disposed at typical track to wheelbase proportions, was used to examine the characteristics of exposed wheels and to establish satisfactory methods of simulating these in the wind tunnel. The effects of variations in wheel width, track, body width, and body form on the aerodynamic

force coefficients of the model are described. Stationary wheels develop a large lift force when brought into contact with the ground, but this force is reduced by wheel rotation. Simulation of normal operating conditions would seem to require only wheel rotation and the prevention of airflow beneath the wheels. Both drag and lift of a vehicle with exposed wheels are increased by greater wheel width of front, rear, or all four wheels. Variations in track of such a vehicle were found to have no significant effect, but widening the body generally increased both drag and lift.

Search terms: Drag; Aerodynamics; Force; Lift; Rotation; Wind tunnel tests; Wheels; Pitch; Vehicle stability; Body aerodynamics; Air flow Simulation models; Wheel propulsion; Mathematical models; Racing automobiles

NHTSA DOCUMENTS**NHTSA Accident Investigation Reports**

HS-600 674 Fld. 1/3

TRI-LEVEL ACCIDENT INVESTIGATION SUMMARIES. LEVEL 3A. INJURY CAUSATION. VOL. 1, NO. 1

Cornell Aeronautical Lab., Inc.

1971 213p 2 refs

Contract FH-11-7098

Summary report for Oct-Dec 1970.

Accident summaries of 50 injury causation cases investigated in depth by the Cornell Aeronautical Lab. team are given. The investigations were conducted to determine the specific injuries incurred and identify the specific interior components causing them. Each summary consists of six parts: identification (date, time, type) of accident; a brief description of the environmental surroundings; details of damage to the

involved vehicles; details of the injury, severity of injury, and source of injury to each occupant of the case vehicle; a description of the precrash, crash, and postcrash phases of the collision; and a scaled diagram of the collision sequence.

Search terms: Trilevel accident investigation; Injury causes; Injury case reports; Accident case reports; Accident types; Environmental factors; Damage; Injuries; Injury severity; Precrash phase; Crash phase; Postcrash phase; Collisions; Vehicle characteristics; Damage severity; Time of accidents; Day of week; Month

AVAILABILITY: NTIS**NHTSA Contractors Reports**

HS-800 602 Fld. 1/1

TELEMETRY AND PHYSICIAN/RESCUE PERSONNEL COMMUNICATION. FINAL REPORT

by Eugene L. Nagel

Miami Univ., Fla.

1971 215p 12 refs

Contract FH-11-7198

Report no. UM-NHTSA-FH-11-7198

A demonstration project in Miami tested the feasibility of advanced emergency medical care in the field by paramedics, including defibrillation, intravenous fluids and drugs, and telemetered electrocardiographic and voice communication with the hospital. Advanced training programs for fire rescue were designed and tested. Community medical and lay acceptance of these techniques was tested. Comparisons were made of this system and other test systems. Evaluation was made of this system's ability to respond quickly to all types of medical emergencies, especially highway incidents involving both trauma and disease, and estimates were made of system effectiveness if extended over large population areas.

**NHTSA Contractors Reports
(Cont'd.)****HS-800 602 (Cont'd.)**

Search terms: Emergency medical services; Demonstration projects; First aid; Feasibility studies; Community support; Medical emergencies; Telemetry; Emergency reporting systems; Communication systems; Electrocardiography; Heart lung resuscitation; Medical treatment; Drugs; Resuscitation; Physicians; Hospitals; Occupant rescue; Fires; Miami; Ambulance personnel training; Emergency training

AVAILABILITY: NTIS

NHTSA Staff Speeches, Papers, etc.**HS-810 189 Fld. 3/1**

REMARKS BEFORE THE ANNUAL MEETING OF THE LICENSED BEVERAGE INDUSTRIES, INC., NEW YORK CITY, JANUARY 26, 1972

by James E. Wilson

National Hwy. Traf. Safety Administration

1972 14p

The role of drunk drivers in the highway death toll is discussed. About 7% of the driving population drives after heavy drinking, and these 7% are responsible for a third of all highway fatalities. Means of controlling drunk drivers are described, including Alcohol Safety Action Projects and alcohol education, especially by television.

Search terms: Alcohol usage deterrents; Drinking drivers; Driver intoxication; Problem drivers; Alcohol Safety Action Projects; Alcohol education; Television; Fatality causes; Accident responsibility

AVAILABILITY: NHTSA

HS-810 190 Fld. 5/17; 5/12**COMPLIANCE RELATIONSHIP—
SUPPLIER, AUTOMOBILE MANU-
FACTURER AND GOVERN-
MENT**

by Francis Armstrong

National Hwy. Traf. Safety Administration

1972 11p

Presented at National Automotive Division Conference, American Society for Quality Control, Detroit, 9 Feb 1972.

The quality control problem is discussed as it relates to compliance with federal vehicle safety standards. The work of the NHTSA Office of Standards Enforcement is described. The critical relationship among the supplier, the auto manufacturer, and the government is discussed. The government does not assume responsibility for validating the manufacturer's certification. Thus quality control and testing by the manufacturer are very important. Results of government tests on vehicles, tires, and equipment are given, with the failure rates that resulted, fiscal years 1968-71.

Search terms: Safety standards compliance; Safety standards compliance certification; Quality control; Federal control; Automotive industry; Manufacturing inspection; Failures; Tire tests; Tire failures; Compliance tests

AVAILABILITY: NHTSA

HS-810 191 Fld. 5/14; 5/4**PARAMETRIC STUDY OF SIDE
IMPACT VEHICLE AGGRESSIVE-
NESS**

by Paul R. Spencer

National Hwy. Traf. Safety Administration

1972 12p 15 refs

Prepared for presentation at the 18th annual meeting of the Inst. of Environmental Sciences.

Crashworthiness is considered from the viewpoint of the occupant of the struck vehicle in a side impact. Peak acceleration of the struck vehicle and its penetration by the striking vehicle are defined as general aggressiveness criteria. A mathematical model was used to study the separate effects of 22 independent physical parameters, one at a time, to determine the sensitivity of the aggressiveness criteria to a wide variation in the parameters. Only half of these were found to be sensitive over the ranges studied. Effects of these parameters are presented in graphic form. Two sets of instrumented vehicle-to-vehicle crash test results were used in conjunction with three sets of rigid-barrier test results to compare against calculated results. Based on the few available data points and the broad assumptions used, the computer program gives reasonably accurate results. It is recommended that further verification be made and that combined effects of the sensitive parameters be studied before drawing general conclusions.

Search terms: Mathematical models; Crashworthiness; Occupant protection; Side impact collisions; Front structures; Computerized simulation; Computerized safety research techniques; Parameters; Barrier collision tests; Side impact tests; Crushing; Vehicle vehicle impact tests

AVAILABILITY: NHTSA

NHTSA Imprints**HS-820 170 Fld. 5/14****WHAT TO BUY IN CHILD RE-
STRAINT SYSTEMS**

National Hwy. Traf. Safety Administration

1971 13p

Most of the 10,000 children under four years of age killed in the past ten years in highway crashes died because they had no restraints to protect them. Investigations also determined that many restraints installed in cars to protect children proved to be no protection at all during crash. Many products sold before the federal safety standard on child car seats took effect in April 1971 are unsafe. Infants up to nine months are particularly vulnerable, so a safety standard is being developed for infant car beds and carriers, which should be anchored by seat belts. From ages of eight or nine months to four years, child car seats and harnesses are indicated. Older children can use a lap belt, which may be combined with a shoulder strap if they are over 55 inches tall.

Search terms: Child restraint systems; Child safety seats; Infant restraint systems

AVAILABILITY: GPO \$.20

HS-820 173 Fld. 5/1

BRAKES. A COMPARISON OF BRAKING PERFORMANCE FOR 1972 PASSENGER CARS AND MOTORCYCLES

National Hwy. Traf. Safety Administration

Published as *Consumer Aid Series* v2 pt1 42p (Nov 1971)

nd

Stopping distances reported by auto and motorcycle manufacturers are listed. The stopping distances are listed in descending order of performance, the best being given first, from 60 miles per hour with fully operational brakes under the most adverse load condition.

Search terms: Brake performance; Stopping distance; Motorcycle brakes; Automobile comparisons

AVAILABILITY: GPO

HS-820 174 Fld. 5/22

TIRES. A COMPARISON OF TIRE RESERVE LOAD FOR 1972 PASSENGER CARS

National Hwy. Traf. Safety Administration

Published as *Consumer Aid Series* v2 pt2 40p (Nov 1971)

nd

Tire reserve loads reported by auto manufacturers are listed in descending order of performance, with the best given first. Tire reserve load is a measure of excess tire load carrying capacity, the percentage by which the rated load exceeds the actual load placed on the

tire when the vehicle is loaded to its maximum recommended capacity.

Search terms: Tire reserve load; Tire performance; Automobile comparisons

AVAILABILITY: GPO

HS-820 175 Fld. 5/4; 5/22; 5/3

PERFORMANCE DATA, NEW 1972 PASSENGER CARS AND MOTORCYCLES

National Hwy. Traf. Safety Administration

Published as *Consumer Information Series* v3 n1 268p (Nov 1971)

nd

Acceleration and passing performance, tire reserve loads, and stopping distances are given for automobile and motorcycle models. The information is arranged by manufacturer, make, and model. The data are intended to help consumers evaluate the safety performance of new vehicles.

Search terms: Tire reserve load; Acceleration; Passing; Stopping distance; Automobile comparisons; Motorcycle safety; Automobile safety characteristics; Brake performance; Tire inflation pressure

AVAILABILITY: GPO